FLIGHT and AIRCRAFT ENGINEER

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The Outlook

A British Iron Curtain?

CONSIDERABLE uneasiness has been expressed in Parliament and elsewhere concerning the sale of military equipment abroad. The feeling that such practice may be dangerous is a very natural one, but when all aspects are taken into consideration, the risk is far less serious than a superficial knowledge of the subject might indicate.

Take, for instance, the sale to a friendly foreign country of a number of fighters. Even in the remotely possible event of that country becoming "unfriendly," the knowledge of the general characteristics of the machine will not suffice to enable it to be built until that country has found out, by painstaking analysis, the composition of the structural materials. Even if it is supposed that tooling-up for the manufacture of the aircraft goes on concurrently with the analysis of the materials, years are likely to pass before the machine could go into production in the foreign country.

In the case of engines, and more particularly gas turbines, the difficulties which confront a would-be copyist are still greater. The materials used for turbine blading, for example, are extremely sensitive to quite small changes in the composition, and it would take a very long time to discover not only the ingredients used, but to acquire what our American friends so aptly describe as the necessary "know-how," to the attainment of which there is no short cut. It has to be gained by long and often bitter experience.

It has been agreed by all parties that this country must export or starve, and the British aircraft industry has contributed a very handsome share to the country's export. And in any case, how is it proposed to enable the countries of Western Europe to rearm except by supplying them with the needed aviation material? They cannot, generally speaking, be expected to produce the necessary aircraft and equipment themselves within any reasonable time.

It must be admitted that when it comes to the issue to foreign countries or firms of licences to build British aircraft or power plants, the position is more difficult. In this case, full information about materials and manufacturing processes is supplied, but even allowing for this fact, there is inevitably a time lag before production can really get going. And so far as the gas turbine is concerned, progress is very rapid, and the Government can and does exercise a strict control over what may or may not be granted a licence for construction abroad. It is scarcely likely to sanction licensing of the very latest information, acquired since the original licence was granted. So here again there is

The Editor and Staff of "Flight" extend to readers at Home and Overseas all Good Wishes for Christmas.

We have in Mind especially the many who are serving away from Home in all parts of the World, and whose Thoughts will turn Homewards more than ever during the next Few Days.

Our Thanks to the Many who have sent us Christmas Greetings. They are much appreciated and heartily reciprocated.

some not inconsiderable safeguard. There are components which simply cannot be produced without certain special machine tools. Reference has been made to turbine blades, which are a problem in themselves. It is likely that a licensee would prefer to obtain his blade blanks from the original manufacturer rather than go to all the trouble entailed in learning how to produce them.

Dissemination of Knowledge

THERE are those who would suppress publication in the technical press of all information about military aircraft and power plants. It is difficult to see how such publication could materially assist a potential enemy. Detailed descriptions do not include the kind of information which would enable anyone to manufacture the aircraft and engine, but even if it did, the security regulations are such that no such description is permitted until the machine or engine has been in existence for a considerable time. Thus, by the time the information was disclosed, and by the time any attempt was made at copying, there would be a very long gap, one of years. Such copying might have been possible in the early days of flying, when aircraft were simple contraptions of sticks, wires and fabric. Production of a modern aircraft or engine is a long and slow process.

Preventing the British technical press from publishing anything about military aircraft would, therefore, not serve any useful purpose by depriving a potential enemy of a source of valuable information, but it would seriously interfere with the spread and general dissemination of knowledge throughout our own country's industry. So far as foreign countries are concerned, the most that the British press can be held to be doing is to publish particulars of something which has been found to "work." That is a lead, certainly, but not, it seems to us, one from which an enemy could derive much practical benefit.

Far more disquieting than publication in the British press of descriptions of military aircraft material already in service is the leakage of information into the American press of information about new British projects. The British technical press has the confidence of the aircraft industry and, we think we may say, of the Government departments concerned. That confidence has been built up through years of scrupulous observance of the security regulations, and it would be journalistic suicide, to put it no higher than that, for a journal to disclose information which it knew to be secret. It would not do that very often before it found the doors of the manufacturers closed to its representatives.

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LONDON LANDMARK: At this season of the year it is appropriate for us to publish this new air photograph of St. Paul's which, for so many, is the spiritual centre of the British Empire. The area surrounding the cathedral was blitzed on the night of May 10th-11th, 1941, and an account of some of the air fighting during that raid appears in the history of No. 1 Fighter Squadron on pages 747-754.

The Future of Air Transport

Some New Thoughts on Airline Operation : "Environmentalism" as a World Force : Annual Average Speed the Criterion of Efficiency : Reduced Performance as a Function of Development Delay

OWING to the very full programme of lectures sponsored by the Royal Aeronautical Society during this winter, it has been found impossible to include a paper of outstanding interest. This was to have been read by a very well known figure in airline and aircraft design circles. Because of its manifestly great importance "Flight" has secured the copyright of this paper, the author of which prefers, for the moment, to remain anonymous. We feel that no airline operator or aircraft designer can afford to ignore the lessons implied in this masterly summary of the present and future trends in world air transport.

IT has become a truism among students of human development to say that man is the product of his environment. Would it not be equally true to say that the machines he has invented are also the product of their own environment? Thus it may be said that aircraft—developed and operated, as they are, by and amongst people with a special passion for academically scientific performances of all kinds—have become the creatures of the laboratory, of the designer's private drawing office and of the aerodynamicist's attic. The design of aircraft—and I am speaking primarily of civil aircraft, since military aircraft remain a law unto themselves—has never been so much a means of producing a suitable system of transport as one of personal gratification and pride for a relatively small group of enthusiasts.

"Environmentalism," as I describe my new theory of aircraft development, has been based on a vast edifice of statistical evidence covering the history of air transport during the last three decades. It would take more than the space at my disposal to give even the bare skeleton of the figures which have been used to bolster up this fundamental truth. All I can hope to do here is to outline some of the implications involved, and to this end my comments are subdivided under three simple headings. The first of these is:

Function

It was my good friend Doctor A. M. Spüffing who coined the famous dictum: "The speed of an airline is the speed of its slowest passenger coach." At that moment he had just spent a period of six hours in the active enjoyment of his first experience of airline travel. During those hours he had made three abortive return journeys by coach between the London terminal and his airport of departure, and had consumed sixteen cups of coffee and nine buns. The weather continued to be aeronautically inclement, and the Doctor completed his journey next day by boat and train, thereby refuting the commonly held view that it is better to travel hopefully than to arrive. The affair was all the more unfortunate because he had been due, on the first evening, to deliver a lecture, entitled "Electronic Aids Have Defeated the Fog Menace," to a very distinguished gathering of Lithuanian air traffic clerks. I assume that he changed the title and altered some of the more optimistic passages in the text.

I mention this episode because it seems to me to underline the environmentalist's primary contention: That the function of any means of transport is to carry personnel or freight from A to B, and to do so according to an advertised timetable unless prevented by Act of God, Hurricane, Tempest, or any other extreme contingency on the unlikelihood of which our insurance companies make the greater part of their profits.

- **Present-day aircraft are the product of their own environment.**
- **An airline marches on its overheads.**
- **In the air it is always better to arrive than to travel hopefully.**
- **The speed of an airline is the speed of its slowest passenger coach.**
- **An airline company can pay its way if it has no aircraft.**
- **The level of an aircraft's performance is in inverse ratio to the time spent on its development.**

To this axiom I should like to add a rider in the form of a suggestion that the published cruising speeds of civil aircraft in service should be based on annual rather than on hourly averages.

A glance at Fig. 1 will make the point clear. Aircraft "X" normally cruises at 200 m.p.h., but is prevented from starting its 200-mile journey on 7 per cent of occasions, and is, because of its difficult characteristics, "stacked" for an hour on a further 20 per cent of occasions. Aircraft "Y" is a more old-fashioned affair, with a relatively low landing speed and a normal cruising speed of 150 m.p.h. Radio and radar developments have succeeded in keeping pace with its performance, so that it can fly on 99 per cent of its scheduled services and is "stood off" for an hour on only 2 per cent of its journeys. If, for the sake of academic argument, we ignore head-wind effects and climb and descent losses, the overall cruising speed of "X" is 143 m.p.h. and that of "Y" is 146 m.p.h.

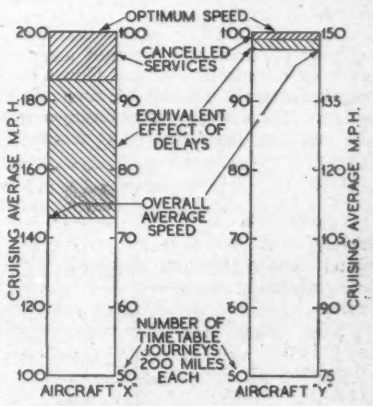


Fig. 1.

Aircraft "Y" has a fatter fuselage, is more comfortable and is much less critical in the matter of its runway requirements in competition with our old friend I.C.A.O. Yet, by my standards, it is faster. It costs less to develop and build and, most important of all, would have saved my friend Spüffing both his roll-and-coffee indigestion and the last-minute expurgations from his internationally important lecture.

Which brings me to the second heading:

Ways and Means

To paraphrase the words of Corporal (later Emperor) N. Bonaparte—an airline marches on its overheads. However economically slowly and safely its aircraft may fly, and however its booking clerks may filch, by soft words and smooth manners, the customers from its competitors, it is all of little avail if the rents of the accountancy and public relations palaces are too high, and if the maintenance and traffic organizations are

The Future of Air Transport . . . . .

too vast. The golden rule for all transport organizations is a fairly obvious one—only fare-paying passengers should be carried.

This is where my statistical records again come into their own. A careful evaluation of the appropriate figures brings out two clear features in air transport operation.

First: An airline company can pay its way if it has no aircraft and is thus saved the cost of the associated operating departments. Second: All well-organized charter operators seem to be able to make a handsome profit by the simple expedient of carrying economic loads in economic aircraft over carefully chosen economic routes.

The solution to all our problems is, therefore, quite obvious. The airline operator who finds himself permanently and unaccountably in the red should sell all his aircraft and make a deal with some reliable charter concern for the permanent hire of all the latter's aircraft.

Knowing the number of passengers likely to be carried and the fares to be charged, and having tentatively enquired about the cost of a long-period loan of aircraft and crews, the airline company cannot fail, unless it is staffed exclusively by morons, to arrange a clear profit for itself. The charter operator, on the other hand, is not likely to be foolish enough to accept the work at any figure other than one which leaves him well covered. Everybody, consequently, is happy.

There is a further small advantage in the scheme: The charter operator can, without any loss of prestige or the risk of a question in the House, purchase second-hand foreign aircraft of a suitable type and at a satisfactorily low price. Thus, while maintaining a reasonable profit level, he can hire his aircraft out for a still lower figure, and everyone is happier than ever; even the taxpayer, who so rarely has any good reason for congratulating his rulers.

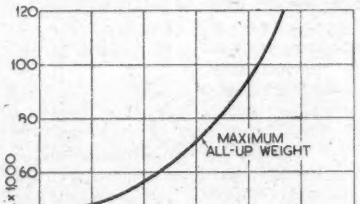


Fig. 2.

Now, having settled the problem of air transport economics, let us return to the means by which the industry can be encouraged to produce the right kind of aircraft with the right kind of payload. In other words, to give each embryonic aircraft the right kind of environment. I have entitled my third section

Defeating the Technician

By way of a start, I suggest that you glance at Fig. 2, which is also based on my statistical records and which forms the crux, not to say the nadir, of the entire problem. The curves are the average for a number of types of aircraft, with extrapolations to indicate likely trends.

It will be seen that, during any particular development period, the all-up weight rises while the payload falls. Similar curves can be drawn to show the gradual reduction of performance in other directions, but this particular example will suffice to make the point. Two features of the graph are immediately apparent: For a relatively short period the two curves remain more or less parallel, with the all-up weight and the payload rising together. Later, however, the two curves diverge, until, at some hypothetical point in time, the former is infinity and the latter is zero.

Fig. 3 provides detail supporting evidence and shows

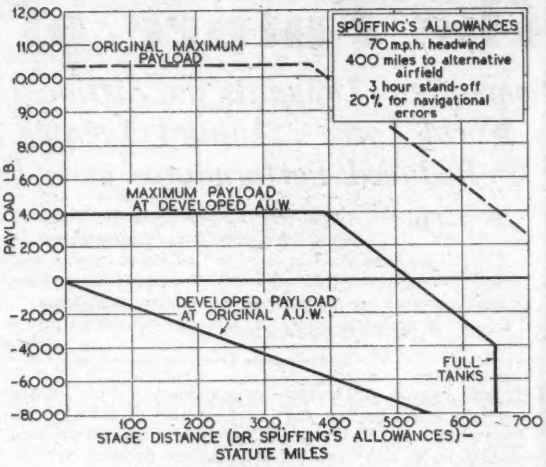


Fig. 3.

the payload and range of an average aircraft at the peak of its development life—say, at the end of the third year. The secondary curve shows the payload as it would have been had the all-up weight remained constant while development continued.

Here, again, the answer seems to be crystal clear. Development periods must be reduced so that, in the words of Hassan, the dog of all-up weight is dragged away by the leash of production from the tail of payload. Think of the energy that would thereby be saved for other purposes.

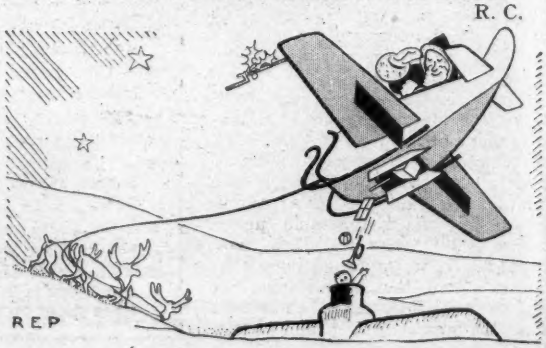
The technicians, tearful for a few weeks, would soon have bright faces again as they were given nice clean sheets of paper and sharpened pencils for the attack on another project; test pilots would cease to suffer sleepless nights at the thought of yet another series of handling trials at a still higher all-up weight; and even the sales department—gloomy at the thought of the better performance which, they imagined, might have been offered to the customers at a much later date—could concentrate for once on the issue of finalized figures. The public relations department would no longer need to sit up at night thinking of new ways of telling the same story, or of explaining to a gaping world the exact meaning of the technical achievement which offered only a very slight reduction in payload for such a splendid increase in all-up weight.

The same cease-fire order would apply with equally good effect to all the ancillary features of the aircraft which provide the visiting airline experts with such opportunities for specialist attention.

We have, in effect, removed the aircraft from its environment before it has become irrevocably diseased. The handling characteristics retain their original charm, the wing loading remains light, the take-off power is low but quite adequate, and the equipment is simple.

But will the airline operator buy it? That is a matter for the sales and public relations people. As a scientist all I can say is that environmentalism is its own reward.

R. C.



B.8

"GIVE 'UM BIRD LOW-FLYING FELLOW!"

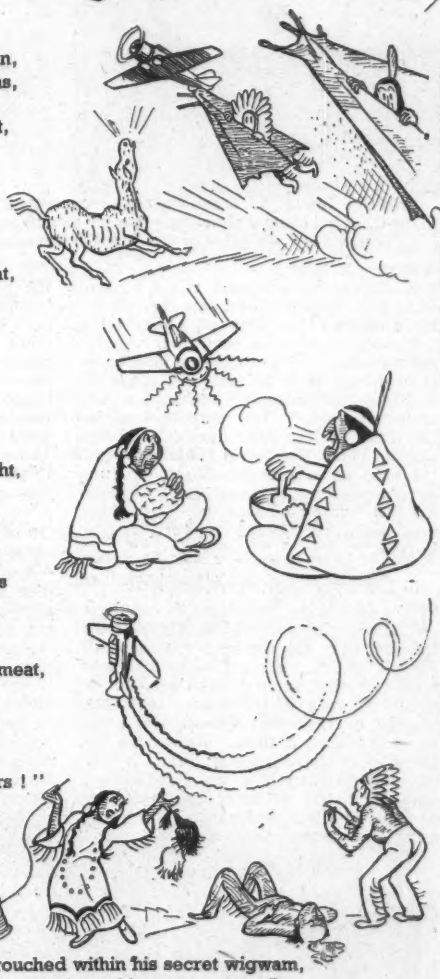
HEAR the song of Jiving Chicken,
Fairest of the Noknee maidens,
Jiving Chicken, Honkitonka,
And her lover, Flying Moosemeat,
Dauntless paleface aviator.

Fleeter than the rugged grizzly
In the amorous month of mating,
Fleeter still was Flying Moosemeat,
Swooping low above the prairie,
Rolling low above the prairie,
Shooting up the shabby bison
In his yellow bird of iron!

Often in the summer mornings
Came he roaring thro' the sunlight,
Shook the teeth of old Nokomis
Forth upon her buttered waffle,
Ruined Sitting Bull's digestion,
Set him belching in his porridge,
Earned the hate of all the mothers
Of incontinent papooses . . .

Flying Moosemeat, Flying Moosemeat,
Rolling in the Grey Hereafter,
Looping in the Land of Shadows,
Bunting in Eternal Twilight—
Nevermore shall Jiving Chicken
Softly murmur "Jeepers Creepers!"
Gazing upwards at your coming,
Pausing with suspended needle
As she sews the scalps together.

Old the story, old the story . . .



Like a hawk came Flying Moosemeat,
Full of humour, full of folly,
Swooped upon the secret wigwam—
But the west wind Mudjekeewis,
Laughed and touched the flashing wing-tip,
Touched it with his gusty fingers . . .

Ere the heart of Jiving Chicken
Missed two beats within her bosom,
There upon the silent prairie
Crumpled lay the bird of iron
Grunting Gopher, no more grunting,
Lay beside it, free from labour,
Round his legs the secret wigwam—

While the head of Flying Moosemeat
Gently rolled across the prairie,
Trundled gently o'er the prairie,
Slowly trundled to a standstill
At the feet of Honkitonka,
Honkitonka, Jiving Chicken.

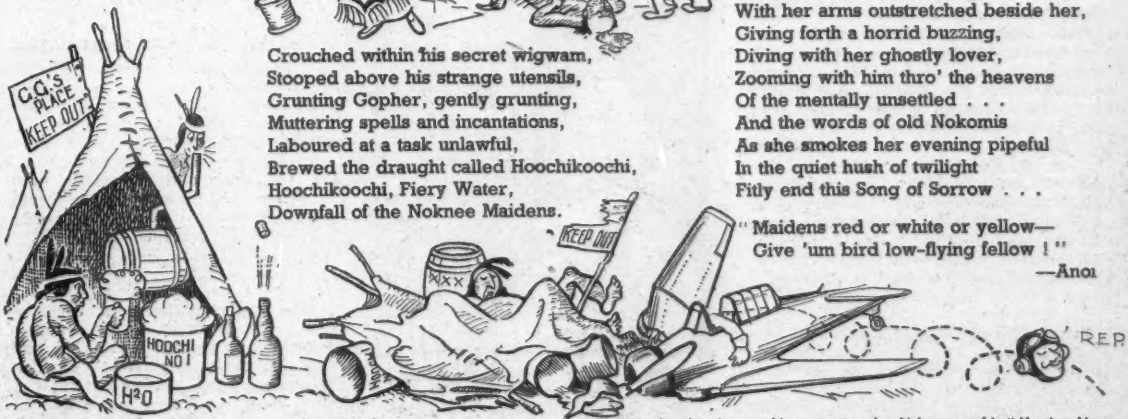
Nevermore shall old Nokomis
Drop her dentures in the chowder,
Nevermore shall Howling Cactus,
Howling Cactus, cunning barber,
Scalp his customers in error,
Terrified by Flying Moosemeat,
Nevermore within his wigwam
Shall the furtive Grunting Gopher
Leg the moccasin unlawful . . .
Nevermore shall Honkitonka
Plait the love-knot in her hair.

But each night she runs in circles,
Honkitonka, Jiving Chicken,
With her arms outstretched beside her,
Giving forth a horrid buzzing,
Diving with her ghostly lover,
Zooming with him thro' the heavens
Of the mentally unsettled . . .
And the words of old Nokomis
As she smokes her evening pipeful
In the quiet hush of twilight
Fitly end this Song of Sorrow . . .

"Maidens red or white or yellow—
Give 'um bird low-flying fellow!"

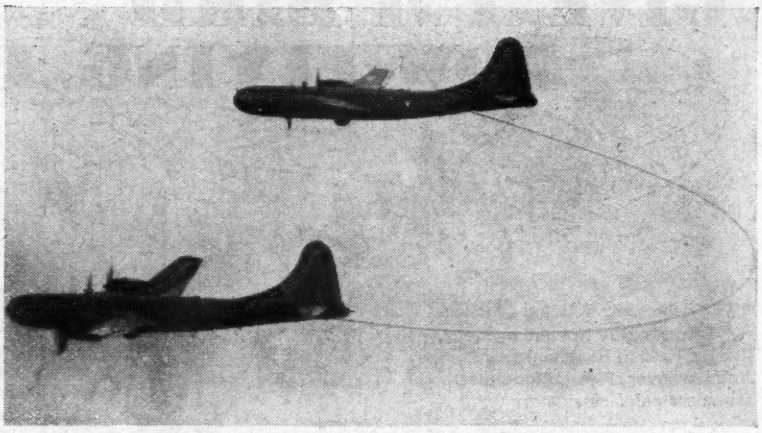
—ANOI

Crouched within his secret wigwam,
Stooped above his strange utensils,
Grunting Gopher, gently grunting,
Muttering spells and incantations,
Laboured at a task unlawful,
Brewed the draught called Hoochikoochi,
Hoochikoochi, Fiery Water,
Downfall of the Noknee Maidens.



Service pilots who were instructed or were trained in the Canadian prairie provinces may remember this clever and humorous parody which appeared in "Mentioned in Dispatches." It was part of a subtle campaign instigated by R.C.A.F. Headquarters to combat low-flying accidents. It is again commended to all pilots who may now be considering their New Year resolutions.

HERE AND THERE



LINK-UP: Two U.S.A.F. Superfortresses undertaking aerial refuelling experiments in America. The U.S.A.F.'s trials of refuelling in the air recently included a flight to Hawaii and back, a distance of 9,400 miles, by a B-50 which was refuelled in flight by Superfortresses.

The Great Reunion

LARGE numbers of former members of the Royal Flying Corps and Royal Naval Air Service have indicated their intention to attend the reunion which is being held at Londonderry House on March 31st. Mr. Geoffrey Dorman has asked us to inform those who have applied that there is a slight delay in obtaining the tickets, but that he hopes to be able to send them out just before New Year.

Double Century

RECENTLY awarded the British Master Pilot's Certificate for land and marine aircraft, Capt. W. J. Craig, of B.O.A.C., on December 13th completed his 100th crossing of the Atlantic in a land aircraft and becomes the first airline captain in the world to complete 100 Atlantic crossings by land aircraft and 100 crossings by flying boat.

Sunderlands off "The Lift"

THE risk of ice forming on Havel Lake caused R.A.F. Sunderland and civil Hythe flying-boats to be withdrawn from operations in the Berlin air-lift on December 14th. No ice had actually formed up to that date but the precaution was taken in case the lake should freeze suddenly. Since July 5th the aircraft are stated to have made 1,365 flights and since November 23rd have evacuated 1,200 undernourished Berlin children. The Sunderlands have returned to their base at Calshot. Among air-lift awards lately announced were two decorations for flying-boat aircrew members—the A.F.C. for F/L. Harkness, of No. 230 Squadron, and the A.F.M. for Eng. II Bennet, of No. 201 Squadron.

Jet-Tudor Demonstration

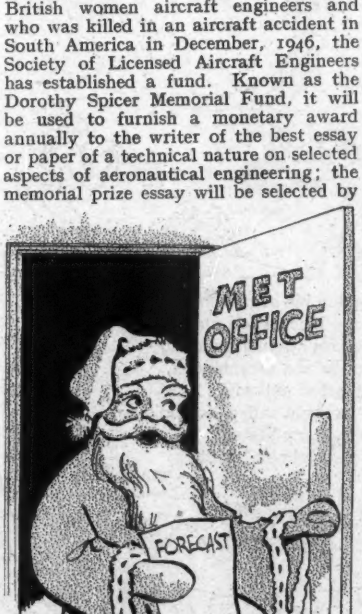
MR. J. ORRELL, Avro's chief test pilot, demonstrated the all-jet Tudor VIII for the workers at the Chadderton factory of the company on December 15th. The weather at the time was stormy and onlookers had a nasty moment when the Tudor after flying between two storm clouds entered one and, just as it disappeared, was struck by lightning. Many people thought that the aircraft had blown up but were relieved to learn that it landed safely at Woodford with only slight damage to a panel of the tailplane. As there had been no lightning before the Tudor was struck it is thought possible that the entry of the aircraft into the cloud precipitated, if not actually caused the flash.

Royal Greetings

THE Tudor I, *Elizabeth of England*, christened by H.R.H. Princess Elizabeth in January, 1947, was recently delivered to British South American Airways after modification to a Tudor IVB. On December 16th the aircraft left London Airport on a normal B.S.A.A. service, and when airborne sent the following message to Princess Elizabeth: "Passengers and crew send their respectful greetings to your Royal Highness from Royal Mail Aircraft *Elizabeth of England*, airborne for Jamaica on her maiden voyage." The reply received by Capt. M. D. Deloford, the aircraft's commander, from Her Royal Highness read: "I send my sincere thanks to the passengers and crew of *Elizabeth of England* for their most kind message of greetings and wish all aboard a very happy voyage."

Dorothy Spicer Memorial

TO perpetuate the memory of Miss Dorothy Spicer (the late Mrs. Richard Pearse), who was the best known of all British women aircraft engineers and who was killed in an aircraft accident in South America in December, 1946, the Society of Licensed Aircraft Engineers has established a fund. Known as the Dorothy Spicer Memorial Fund, it will be used to furnish a monetary award annually to the writer of the best essay or paper of a technical nature on selected aspects of aeronautical engineering; the memorial prize essay will be selected by the S.L.A.E. from those submitted by licensed aircraft engineers, and the winner's name will be engraved on a plaque hung in the society's head office. Miss Spicer was the first woman to hold A. B. C and D maintenance engineers' licences. All those wishing to associate themselves with this memorial are invited to send donations to the Hon. Treasurer, Dorothy Spicer Memorial Fund, S.L.A.E., Finsbury Circus House, Blomfield Street, London, E.C.2.



". . . . and what's the wind at chimney-pot level."

Lockheed Liaison

AN innovation in the Lockheed Aircraft Corporation's customer service programme is announced with the appointment of Mr. C. F. Schmidt to the new position of airlines operations engineer. In this appointment Mr. Schmidt will continue as a member of the Lockheed engineering flight test division but will devote his entire time to assisting airline operators to develop procedures and techniques for obtaining maximum efficiency in their operations. Since 1941 Mr. Schmidt has been closely connected with flight tests of the Constellation and during 1945 and 1946 as the aircraft came into commercial service he has spent much of his time assisting operators in working out problems and developing long-range cruise control techniques.

Touring Guide to Australasia

THE second of the series of Air Touring Guides has been issued by the private aviation division of the Fédération Aéronautique Internationale. This touring guide gives detailed information relating to flights between the U.K. and Australasia and follows the first of the series dealing with routes for light aircraft from the U.K. to South Africa, reference to which was made in *Flight*, April 22nd, 1948. The guide to Australasia is divided into three sections, the first of which gives details of formalities and regulations to be complied with before a flight of this nature is undertaken, together with a check-list of documents that must be carried and comments on the meteorological conditions likely to be encountered. The second section gives a choice of routes and outline maps, and the third section gives information on every airfield on the

HERE AND THERE

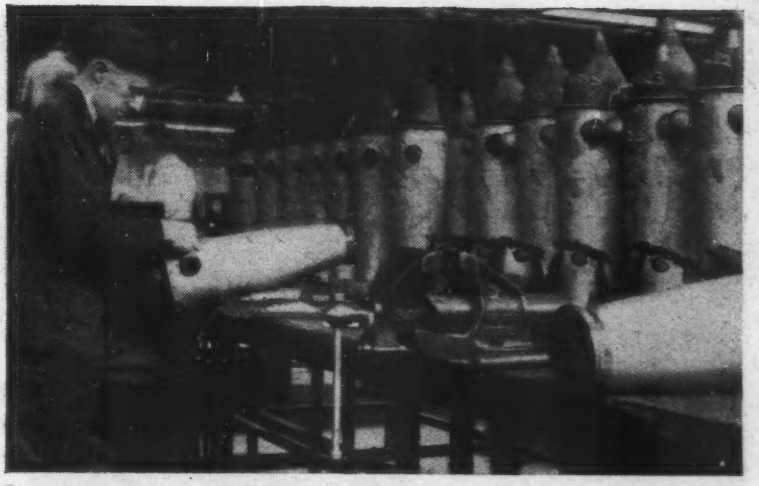
routes and comments on radio facilities. Copies of this guide may be obtained, price £1 (or 15s to national aero and flying clubs) from the F.A.I., Londonderry House, Park Lane, W.1.

Navion Production

IN exactly a year since the Ryan Aeronautical Company began production of the Navion, 500 of these aircraft have been turned out. Before Ryans took over manufacture, North American Aviation had built more than a thousand of these aircraft. Deliveries of the Navion during October amounted to 74 machines and thus exceeded the previous highest monthly figure of 71 recorded during June, normally the peak of the selling season. Ryans are at present working on a 2½ million dollar U.S.A.F. contract for 158 L-17B Navion liaison aircraft and spares equivalent to approximately 60 further aircraft. The first of these military liaison aircraft has been delivered and has been handed over to the U.S.A.F. at Wright Field for accelerated service testing.

Atom Bomb Film

ON December 14th the film show given by the Royal Aeronautical Society and Mr. William Courtenay was attended by a capacity audience. After Mr. Courtenay's colour film of Their Majesties the King and Queen, and H.R.H. Princess Margaret at Cranwell on the occasion of the presentation of the King's Colours, which was followed by a film of the Berlin airlift, the official U.S. documentary showing the atom bomb experiments at Bikini in the Pacific was exhibited. This was a truly awe-inspiring film which, besides indicating the extensive and thorough preparations for scientific observation and recording of the experiments, includes many excellent "shots" of the two atomic explosions and their effects on the target area.



THE MODERN POTTER: Assembling the combustion chambers of de Havilland Goblin gas-turbines now in quantity production for both home and export orders. Each Goblin has sixteen combustion chambers which are double walled.

News in Brief

A GLIDER pilot in Sydney, Australia, with only four hours flying time to his credit recently took a sailplane to a height of 10,000 feet between Camden and Bankstown. He landed safely at Camden airport.

* * *

The new bar at Ringway Airport has been surfaced with Formica, a new laminated plastic made by De La Rue Insulation, Ltd. The material is proof against cigarette burns and stains.

* * *

The Anglo-American Oil Co., Ltd., have appointed Mr. E. J. Boorman to be chief chemist. Mr. Boorman was formerly head of the Esso Development Co., Ltd.'s research group, which he joined shortly after the war.

The first of the 22 Canadair Fours being built in Montreal for B.O.A.C. has been transferred from the assembly line for fitting out with navigation and passenger equipment. The completion of the aircraft is expected to take about three months and the machine will be ready for delivery early in 1949.

* * *

Cargo and air freight-handling offices of Pan American World Airways on December 6th moved to Princes Arcade, 190, Piccadilly, or 37, Jermyn Street, W.1. The new premises are under the supervision of Mr. George Batson.

* * *

G/C. W. A. Rollason, Chairman of W. A. Rollason, Ltd., of Croydon, is at present in hospital recovering from a minor operation. It is not expected that he will be able to return to business until the end of January, 1949.

* * *

A report from Nanking on the subject of British aircraft operated by the Chinese air force states that out of 240 Mosquitoes delivered to the Chinese air force 66 were wrecked during take-off or landing and only eight aircraft remain operational.

* * *

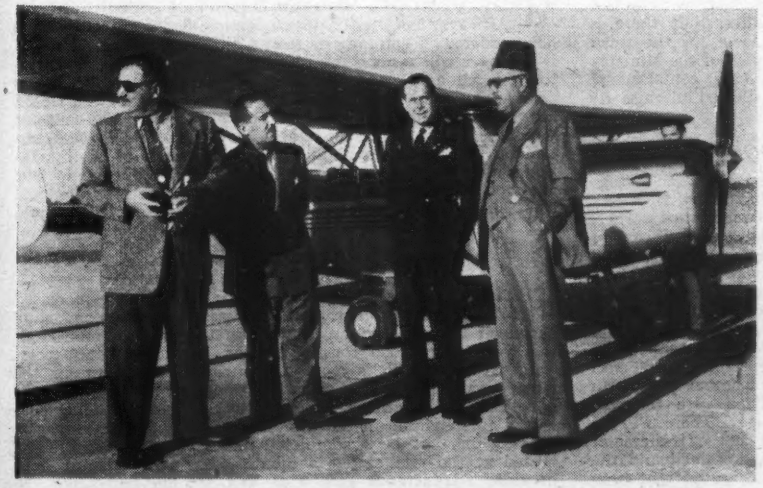
The U.S. Civil Aeronautics Administrator, Mr. Del Rentzel, arrived on December 13th at London Airport for a brief visit to Britain. He is here for informal discussions on problems connected with air navigation and air traffic control.

* * *

The Atomic Research Station, Harwell, is now marked from sunset to sunrise by a red beacon flashing fifty times per minute. Pilots are instructed in *Notice to Airmen*, No. 423, that when flying in the vicinity of this beacon, to keep at a minimum height of 1,500ft.

* * *

Commenting on America's military and strategic position in Japan resulting from the Communist advances in China, Gen. MacArthur is reported as having asked for more ships, aircraft and men. The 11th Airborne Division's return to the U.S. is said to have been cancelled.



SUPER ACE IN CAIRO: Two Chrislea Super Aces, on their way to Rhodesia where they have been sold, gave demonstrations at the Embala airport, Cairo, before a gathering of enthusiasts invited by Col. E. P. J. Ryan the S.B.A.C. representative in the Middle East. Left to right: H. H. Prince Soliman Daoud, President of the Royal Aero Club of Egypt; Kamal el Din Kotby, Chief Executive, Misr Aeronautical Institute; Col. Ryan and Mohammed Rushdy Bey, managing director of Misr Airlines.

CIVIL AVIATION NEWS

NIGHT DEPARTURE: In preparation for take-off at 2100 hours Rajput Princess, *Air India International Constellation, is being loaded with freight on the tarmac at London Airport. It is rather interesting that through differences in local time, passengers in India depart from Bombay in the early hours of the morning and arrive in London for late tea the same day. The flight through Cairo takes 22 hours of elapsed time.*

Avro Freighter and Tudor Developments : Drover on Test : B.E.A. Cancel Services to Berlin

CORPORATIONS' HALF-YEAR

PROVISIONAL operating results of the three British Corporations for the six months April to September, 1948, have been made available and show some over-all improvement over the previous year. B.O.A.C. has a total deficit of £2,684,000 compared with £3,164,000 for the same period last year. B.E.A.'s defict is £897,000 compared with £1,315,000, but B.S.A.A.'s deficit has increased to £410,000 from £211,000. It must be remembered that these figures are for the most favourable period of the year and the deficits for the second half will probably be larger than these. In the midst of a miscellany of excuses for the continuing heavy deficits the Ministry of Civil Aviation suggests that there has been substantial progress over the last two years, but admits with some reservation that there is still far to go. As the Corporations go down for the third time there is a note of desperation in the voice of the Ministry as it says: "If defeatism were the worst enemy, complacency would run it close, and neither is being allowed to raise its head by the Corporations."

AVRO CIVIL TRANSPORTS

SOME preliminary details of the Avro Freighter, the specification of which has been under discussion by B.O.A.C. and B.S.A.A., have become available. As mentioned earlier, it is something of a combination aircraft, having certain characteristics in common with the Tudors, but it should nevertheless be regarded as a completely new design. There will be some similarity between the wings and centre of the Freighter and the Tudors, and the four engines are expected to be Merlin 623s. However, even the centre section will need considerable stiffening and modification to accommodate the new main-wheels mounting of the specified nose-wheel undercarriage. Although the prototype will probably fly with the tail-down undercarriage, it will be fitted with the new nose ready to accommodate the nose wheel. There will be no parallel sections to the fuselage, but the 11ft-diameter circular form on the centre section will be retained and the rear portion of the fuselage, and the tail will be different from the Tudors. The overall length will be rather less than the Tudor II.

Mention was recently made also of a Tudor IX, a development of the jet Tudor VIII research aircraft. This will be fitted eventually with a nose-wheel undercarriage similar to the Avro Freighter, and there will be other modifications as dictated by experience with the VIII.

The single airline operating Tudors, B.S.A.A., has so far taken delivery of three Mk IVs, two Mk IVbs and two Mk Vs. The IVb differs from the other marks in having a flight engineer station. The Corporation expects delivery of four more Mk IVbs and ten Mk IVcs and three more Mk Vs, making an eventual fleet of 24 Tudors, all of which will eventually be converted to the same interior layout as the Mk IVc. In the Mk IVc the most forward cabin has been converted to a galley and the second cabin into sleeping accommodation for four. Whereas the Mk IVb carries 32 passengers, the IVc will carry four passengers fewer.

B.E.A. APPOINTMENT

MR. J. V. WOOD, Managing Director of British European Airways, has been ill for some time and his doctors have now ordered a prolonged rest. In consequence, Mr. G. D'Erlanger will resume the responsibilities of Managing Director as well as those of Chairman. In view of the heavy demands already made on the Chairman, however, the Board has approved the appointment of Mr. Peter Masefield as Assistant to the Chairman. Mr. Peter Masefield is Director-General of Long Term Planning in the Ministry of Civil Aviation and is at present returning home from New Zealand. The Minister of Civil Aviation has agreed to release Mr. Masefield from his present appointment, and he is expected to join B.E.A. early in the New Year.

AIR FRANCE FREIGHTERS

FREIGHT and cargo activities in Air France have increased to such proportions that the company is busily converting passenger aircraft into freighters. In the first six months of this year over 6,000 tons of freight, including newspapers, were carried, which is more than twice the amount for the same period last year. Five four-engined Languedoc 161s have been taken out of passenger service and are being converted to freighters in the company's workshops at Toulouse. Already one has been completed and the remainder are expected at the rate of one a month. A double-opening door provides an entrance 5½ft wide and 5ft 8in high, and the cabin floor is being reinforced to support 164 lb to the square foot. The cabin offers a cubic capacity of 754 cubic feet, and is divided into three compartments by means of webbing supported on removable telescopic struts from ceiling to floor. There is a 2ft wide passageway along the port side. Maximum useful load of the Languedoc freighter is 11,660 lb over a range of 400 miles.

DROVER TRIALS

RECENTLY the prototype Drover was flown to Melbourne by Brian Walker, test pilot for de Havilland Aircraft Pty., Ltd., for flight trials by the Australian Department of Civil Aviation. The flight of 460 miles was made at a true air speed of 140 m.p.h., and fuel consumption was approximately 22 gallons per hour. Already the flight trials are well under way and preliminary reports indicate very satisfactory results. During makers' trials the rate of climb at sea level on one engine was found to be 240 feet per minute (I.C.A.N. atmosphere). The second prototype is now nearly completed and it is expected that production will start early next year.

NAVIGATION EXHIBITION

AN exhibition, "Navigation Through the Ages," organized by the Royal Geographical Society and the Institute of Navigation, was opened by H.R.H. The Duke of Edinburgh, on December 17th. Among the exhibits on loan from the National Maritime Museum, the Science Museum and other museums, societies and Government organizations are historic and modern instruments, charts and maps of great explorers, and modern radar aids. The exhibition is held at the Royal Geographical Society, Exhibition Road, S.W.7, and is open to the public on weekdays from 10.30 a.m. to 6 p.m., 7.30 p.m. on Wednesday, but will close on Christmas Day, Boxing Day and Sundays.

SABENA ACCIDENT REPORT

THE Chief Inspector of Accidents has reported on the crash involving the Sabena Douglas DC-3 OO-AWH at London Airport on March 2nd, 1948. The aircraft left Evère Airport, Brussels, at 1940 hours on a scheduled flight to London Airport and normal radio communication was maintained throughout with Brussels, Uxbridge and London Airport. Permission was granted by Uxbridge at 2026 hours for G.C.A. facilities to be used and at 2048 London Airport informed the aircraft that visibility was 200 yards and that conditions were calm. After that the London Director of the G.C.A. passed information on the course to steer, barometric pressure and that sodium lights covered the first 200 yards of the runway. A series of courses and heights to fly were then passed which placed the aircraft in position for a talk-down, and the duty talk-down controller accepted the aircraft for the final approach for landing on runway QDM 100 deg at a range of 7 miles and height of 700 feet. At that time the aircraft was 500 feet to the left of the centre line of the runway and azimuth corrections were passed. Distance of the aircraft from the touch-down point were given at each quarter-mile from seven miles to two miles and each quarter-mile from two miles to quarter mile. During the greater part of the approach the pilot was informed of his height relative to the glide path and at a quarter of a mile from touch down he was 60 feet above. At a range of approximately 300 yards the pilot was told to look ahead and land, that range of 300 yards being coincident with the beginning of the runway. In azimuth the aircraft was 80 feet to the right of the centre line of the runway and that track had been steadily maintained from a distance of three-quarters of a mile. Two witnesses saw the aircraft flying over the runway at height of about 40 feet, after which it was seen to turn left with its landing lights on and to lose height rapidly until it struck the ground. The Inspector concludes that after a satisfactory G.C.A. approach the aircraft was flying a few feet above the runway when the last few sodium lights were passed. The pilot had anticipated making a normal landing but his visual contact was impaired by the sudden change of lighting. While endeavouring to re-establish visual contact the aircraft was allowed to climb, and the pilot switched on the landing lights, the glare from which made visual contact even more difficult. During those few moments the aircraft veered to the left and stalled from a height of about 50 feet. In the opinion of the Chief Inspector the accident was due to a misjudgment on the part of the pilot when trying to land at night in conditions of very poor visibility.

S.E. ASIA MEETING

DELEGATES to the South-East Asia Regional Meeting of I.C.A.O. in New Delhi, as reported in *Flight*, November 25th and December 15th, are considering recommendations made by the Search and Rescue Committee to improve the existing rescue facilities in the region. They have recommended helicopters to aid search and rescue work in certain areas, including four in India, the setting up of two further centres for rescue co-ordination, and various measures for training the marine and air crews engaged on the operations. Delegates are also considering safety measures to improve airfields in the S.E. area and the establishment of 15 Flight Information Regions, two of which would be new and located at Bangkok and Canton. Recommendations have been made to bring procedures in the control of aircraft into line with other I.C.A.O. regions and improve the operational safety of the region.

BERLIN SERVICE CANCELLED

AS a temporary measure British European Airways has cancelled services between Berlin, Hamburg and London. Bookings up to Christmas are understood to be heavy, but passengers will be accommodated on R.A.F. Transport Command aircraft. Although it is not officially confirmed, the decision has been taken as a result of regulations introduced by the R.A.F. to regulate the air traffic into the Berlin area. All aircraft operating on the air lift are required to home on to a Eureka beacon and position themselves within only a small margin of a stated time. B.E.A. Vikings do not carry Rebecca and, in consequence, find it difficult to comply with the regulations to fit into the air traffic pattern. It is possible that B.E.A. may charter Dakotas, equipped with Rebecca, from B.O.A.C. and resume the services into Berlin.

BREVITIES

A NEW runway measuring 2,000 yards was opened at Fuhlsbüttel, Hamburg, on December 15th. It is the first to be constructed for civil aviation in Germany since the war, and is equipped with a central line of lights for night landing.

* * *

It is understood from New Zealand that Tasman Empire Airways may be dissolved by the withdrawal of the U.K. from the partnership, and by the flying of separate services by the Australian and New Zealand Governments. It is known that A.N.A. is keen to operate a service but permission has not yet been granted by the New Zealand Government.

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The American Civil Aeronautics Board has ordered all U.S. domestic airlines to carry a flight engineer in addition to two pilots on all aircraft certificated for more than 80,000 lb take-off weight. Airlines estimate that the new regulations will cost some £5,000,000 in the first year with recurring costs amounting to about £2,500,000 in subsequent years.

* * *

S. Instone & Co., Ltd., have disposed of their interest in Instone Airlines 1946 (Malta), Ltd., to Maltese buyers. In consequence of this the company are no longer interested in Air Malta, Ltd., but Instone Lines, Ltd., continue to act as the Maltese airlines' general agents in the U.K.

* * *

The British Air Line Pilots' Association held their annual get-together at the Savoy Hotel on December 15th. The guests included representatives from every sphere in aviation in the U.K., and representatives of pilots' associations overseas. There were two from Canada, one from Australia, and one each from Central Africa and Holland. The secretary of the Irish Air Line Pilots' Association was also present.

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Regular air services between Bangkok and Jogjakarta, capital of the Indonesian Republic, are shortly to be started by Pacific Overseas Airlines, a Siamese company. The Nether-

Civil Aviation News . . . . .

lands Government have granted permission for the service to operate provided that the aircraft stop at Batavia for passenger and luggage inspection. A trial flight, including night stop at Singapore, took place on December 18th.

* * *

During the six months of the summer season (April to September) B.O.A.C. carried 73,605 passengers and 1,567 tons of freight compared with 61,560 passengers and 879 tons of freight for the same period in 1947. These figures show an increase of 20 per cent in passengers and 78 per cent in freight.

* * *

On December 11th the Swissair direct connection between Zurich and Manchester started. An inaugural ceremony took place at Manchester and the President of Zurich Council was welcomed by the Lord Mayor of Manchester. The service operates twice weekly in each direction.

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Discussions are taking place with the object of providing Glasgow city with an airways terminal. Sir Hector McNeill, the Lord Provost, believes the problem to be important and that air travellers to Glasgow should have facilities equal at least to those in Manchester where a terminal building has been provided on a bombed site, and in which foreign airlines are also accommodated.

* * *

Figures for November show that American Overseas Airlines flew 1,171 passengers to Europe compared with 636 for November, 1947, an increase of 84 per cent. Passengers flown to the U.S. from Europe numbered 3,168, an increase of 38 per cent over November, 1947. A.O.A. consider that the increases are due to the 30-day excursion fares which were introduced on October 1st. The dock strike which held up the *Queen Elizabeth* and *Queen Mary* did not materially increase bookings to Europe.

* * *

There is likely to be a shortage of airline pilots in Australia in the future as the supply from the R.A.A.F. has already fallen to a trickle. The airlines have agreed that unless pilots can be attracted to Australia from overseas a training school will have to be provided and financed jointly by the Government and the airlines.

* * *

According to an official survey of Russian air transport some 125,000 miles of routes are regularly flown by the airlines and the volume of traffic in 1948 has increased 50 per cent over last year. The longest route is from Moscow to Khabarovsk on the border of Manchuria, a distance of about 4,500 miles.

* * *

As a result of negotiations between the Canadian Airline Pilots' Association and Trans-Canada Air Lines, captains and first officers have been offered increases in salary up to 30 dollars a month. The Association had asked for a 20 per cent increase for pilots of twin-engined aircraft and a larger increase for the pilots of multi-engined aircraft, and the original T.C.A. counter proposal was for 30 dollar increases for captains only. The dispute has now been referred to the Federal Labour Department.

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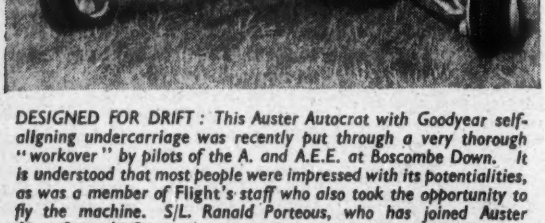
Plans to establish an intrastate airline have been approved by the New South Wales Government and submitted to the Commonwealth Government for approval. It is proposed that the State and the Government should each contribute half the cost of forming the airline which would buy out Butler Air Transport Pty., the largest airline operating in New South Wales. Owing to petrol rationing the company's services have been cut by almost 25 per cent and they have stated they are willing to sell.

FROM THE CLUBS

THE Derby Aero Club completed 43 hours during November in spite of the fact that for nearly two weeks, owing to fog, no aircraft left the ground. Besides the 43 hours' flying by club machines the private owners gained some useful experience in cross-country flying in poor weather conditions. Over 200 members and their guests attended the annual ball at Derby Airport, which was greatly enjoyed. Advantage is being taken of the slack period to improve the amenities of the clubhouse, and additions to the furniture and equipment are being made.

* * *

SINCE the formation of the Kent Coast Flying Club, which took over from the Cinque Ports club on October 1st, over 60 hours were flown during the first month, using only one Magister. In November 45 hours were flown on the same aircraft. The second Magister, now completing its C. of A., will be ready early in the New Year, and further aircraft, possibly including an Auster and a Proctor, are expected to be available for club flying at Lympne in the spring. The membership now exceeds 70 and further applications are coming in satisfactorily. During its first two months the Kent Coast Club has passed out ten successful A licence pupils. The clubhouse is taking shape well and when the amenities and furnishing are completed attention is to be given to organizing the social activities of the club. Membership costs £1 1s subscription and there is no entrance fee.



DESIGNED FOR DRIFT: This Auster Autocrat with Goodyear self-aligning undercarriage was recently put through a very thorough "workover" by pilots of the A. and A.E.E. at Boscombe Down. It is understood that most people were impressed with its potentialities, as was a member of Flight's staff who also took the opportunity to fly the machine. S/L. Ranald Porteous, who has joined Auster Aircraft as chief test pilot, gives characteristically startling demonstrations with this aircraft.

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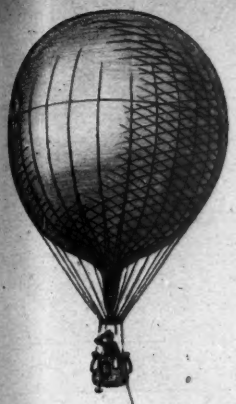
CELEBRATING its 21st anniversary the Scottish Flying Club held a dinner and dance in Glasgow on December 10th which was presided over by Mr. J. G. Weir, the vice-president of the club. The toast to the club was proposed by Mr. John Ure Primrose, Lord Provost of Perth, to which Mr. Weir replied. Mr. Weir said that the private flyer of 20 years ago was comparatively free to travel wherever he wished and was a welcome visitor at a large number of small landing fields where the needs of both man and machine could be cheaply fulfilled; this freedom was now severely restricted by present regulations.

* * *

IN its December bulletin the Lancashire Aero Club reports a good year in which considerable progress has been made; if continued and slightly improved, the club's position will be far more favourable than it has been. New members are needed and more flying by present members is to be encouraged. During November four new members joined the club and some of the stauncher members took advantage of breaks in the generally poor and foggy weather to put in some very pleasant flying hours. Plans are being made by the Club's Committee to start a small accident fund. Under existing arrangements members are called upon to pay the first £15 of any insurance claim for damage to aircraft. It has been suggested that members should pay a fixed sum each year into a fund from which, in the event of an accident, assistance in the payment of the £15 could be drawn. The idea seems a good one and details are to be worked out and submitted to members for their opinions.

It has been decided to run the Crossley Trophy Competition during the first quarter of 1949, the contest taking the form of a "treasure hunt." Those who enter flying club aircraft will not be called upon to pay an entry fee but private owners will be charged 10s per entry. The club will be closed from December 23rd to 26th inclusive. Any experienced member wishing to fly between these dates may make prior arrangements to do so.



Seventy Years Airborne

A History of No. 1 Fighter Squadron and its Antecedents

By John Yoxall

THE origin of our premier squadron is not wrapped in mystery, but its roots do go back right into the very beginnings of air force in Great Britain. At Woolwich Arsenal in 1878 experiments were begun with military balloons, directed by Capt. R. P. Lee of the Royal Engineers. After the unit had been operating for some twelve months it was established that Britain possessed a "thoroughly sound and reliable fleet of five balloons."

One of these balloons accompanied the troops on manœuvres that year, and in the review held at the conclusion of the exercises Capt. H. Elsdale, who was in charge of the party, passed the saluting base in the car of the balloon, "flying" at 250ft. The ground transport and towing arrangements were in the charge of Capt. J. L. B. Templer, who was the officially appointed Instructor in Ballooning and who, later, with the rank of colonel, became the first superintendent of the Balloon Factory—the forerunner of the R.A.E.

Some four years later, in 1882, when military ballooning had been pronounced a success, the unit was removed to the School of Military Engineering at Chatham to start a small balloon factory, depot and school. Major Lee was in charge of flying and Major Templer in charge of construction.

Balloons saw service in Bechuanaland in 1884, under Sir Charles Warren, and again in 1885 in the Sudan, but on the return from these two expeditions official backing for a regular balloon section was lacking, and it was only the enthusiasm, and partly the financial aid, of Majors Elsdale and Templer which kept things going.

In addition to his great interest in military aeronautics, Major Elsdale was a pioneer in aerial photography, and we are fortunate in being able to reproduce an unretouched air photograph of the Balloon Camp at Lydd, taken by him in 1886. It has been kindly loaned to us by Colonel Sir Charles Arden-Close, K.B.E., C.B., C.M.G., D.Sc., F.R.S., who was present in the camp as Lt. C. F. Close, R.E. Sir Charles has compiled a scrap-book on military ballooning in which, among many items, it is interesting to read of the mode of military transport of aircraft in the eighties. "The wagons (1 Balloon Wagon, 3 or 4 Tube Wagons and 1 G.S. Wagon) were towed by a 'steam sapper' at four to five miles per hour. The Commanding Officer rode ahead in patrol jacket, riding breeches, jack boots and sword, followed by a sapper carrying a red flag in accordance with road regulations."

Another interesting note in the scrap-book is the data for Short Bros. balloons. For the latest strapped 10,000 cu ft type, the envelope weighed 85 lb, the net 50 lb, valves 4 lb and car 20 lb.

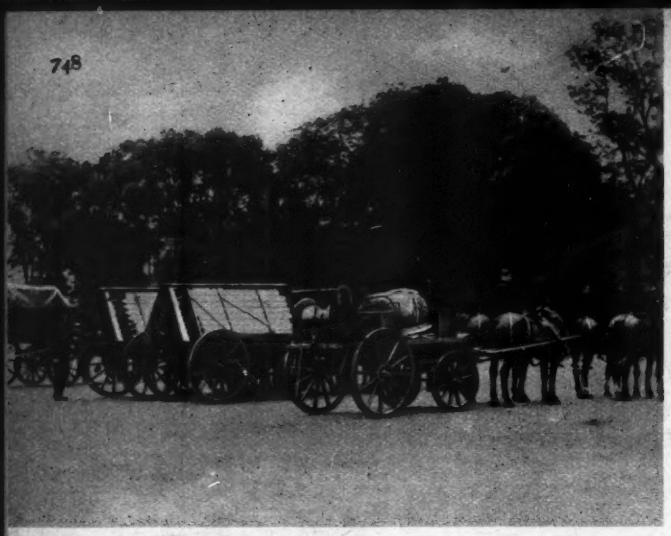
In 1890, after a favourable report by Sir Evelyn Wood, the Balloon Section was introduced into the British Army as an established unit of the Royal Engineers and, after various moves, settled down in Aldershot.

The last year of the nineteenth century saw the South African War in progress, and four balloon sections were on active service. How much use they proved to be is difficult to assess. Certainly they enabled a General fighting a battle, to know to some extent what was going on in the enemy's lines. Signalling, however, was only by flag—either morse or semaphore—and was rather unsatisfactory.

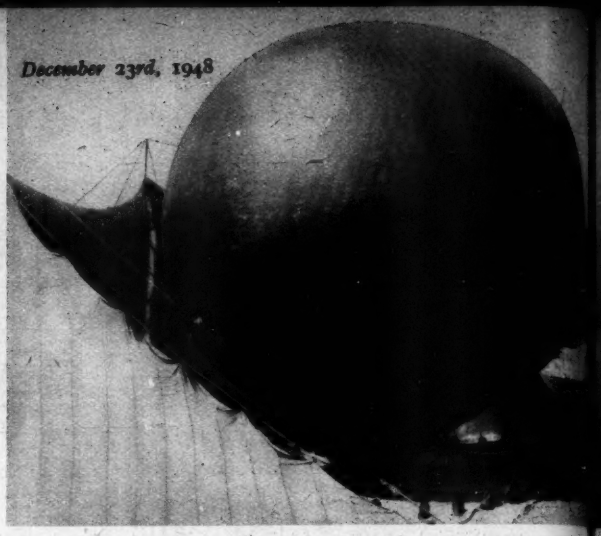
Later came the natural development of balloons to airships, and in September 1907 the embryo No. 1 Fighter Squadron took on charge the first British Army airship, the *Nulli Secundus*. It is interesting to note that a special radiator for its 45 h.p. Antoinette engine was designed by a young man at the Factory, by the name of Geoffrey de Havilland, now, of course, Sir Geoffrey. The *Nulli Secundus* had a still-air speed of about 16 m.p.h., and its most famous flight was one which started at Farnborough and proceeded to London where the airship circled St. Paul's Cathedral and, being unable to make the return flight against the wind, finished at the Crystal Palace.

On the 28th of February, 1911, an Army order was issued creating the Air Battalion of the Royal Engineers. The new battalion was divided into two companies; No. 1

Squadron headquarters. An air photograph of surprising quality taken by Major Elsdale in 1886 of the Balloon School camp at Lydd in Kent.



Packed for transport. A complete balloon unit ready to move off. The gas cylinders were found to be very heavy for horse transport.



His Majesty's Balloon "Swallow" of the Royal Engineers, snug behind its canvas windscreen. These two balloon unit photographs are from Sir Charles Arden-Close's scrap-book.

Seventy Years Airborne . . .

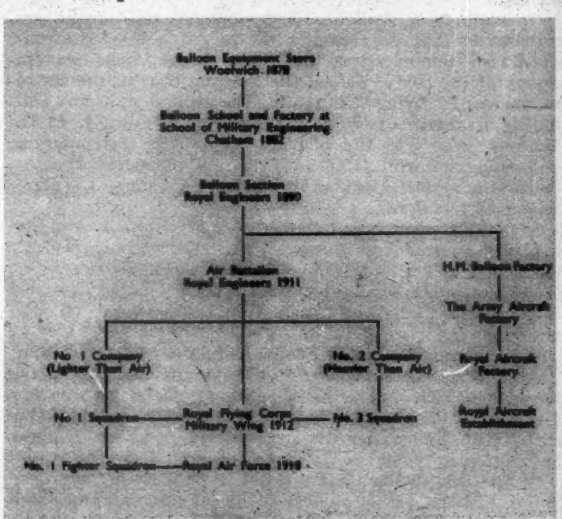
Company was to have the airships and No. 2 Company the aeroplanes. Other non-rigid airships were built, notably the Beta, Gamma, Beta II, Delta and Epsilon and, if no very great feats of airmanship were performed in them, they certainly proved their worth, for it was with them that the first air-to-air and air-to-ground radio signalling was practised.

The Air Battalion had but a short existence and the Royal Flying Corps was constituted by Royal Warrant on April 13th, 1912, No. 1 Squadron taking over the duties of the old No. 1 Company.

The squadron's first commanding officer, Capt. E. M. Maitland, may truthfully be said to have instituted the squadron's motto, "In Omnibus Princeps" (First in Everything), for he had many firsts to his credit. He was first through the Iron Curtain by making, in 1908, a 1,117 miles balloon trip with Major C. C. Turner (for many years the air correspondent of the *Daily Telegraph*) and Prof. A. E. Gaudron, from the Crystal Palace to Mateki Derevni in Russia in 36½ hours. The balloon was the *Mammoth* of more than 100,000 cubic feet capacity. He also made the first parachute descent from an airship—the Delta—in 1913, and in 1919 was on the R.34 when it made the first air voyage from England to New York and back. Airships were his great love, and it was a cruel blow that he should lose his life, on August 24th, 1921, when the R.38 crashed in the Humber.

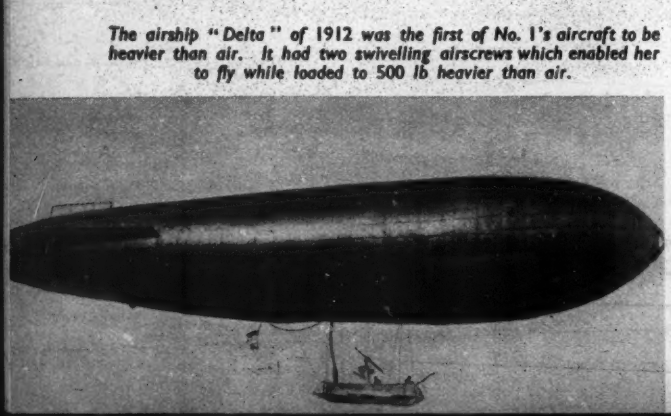
With such a man in command, the squadron was undoubtedly a first-class unit, but opinion was very divided as to the military value of the airship and, finally, it was decided, in May, 1914, to hand all airships over to the Royal Navy and to refit No. 1 Squadron as an aeroplane unit; Major C. A. M. Longcroft became the C.O. Because of this change, the squadron was not able to proceed to France with Nos. 2, 3, 4 and 5 Squadrons, at the outbreak of the Great War in August, 1914. It was stationed at Netheravon with No. 7 Squadron until it went to France under the command of Major W. G. H. Salmond on 7th March, 1915. The unit's aircraft were made up of eight Avro 504s and four B.E.8s. The latter enjoyed the delightful soubriquet of "Bloaters."

On arrival the squadron was in action almost immediately in the battle of Neuve Chapelle, which was then raging, and the first report of action contains the famous names of Capt. E. R. Ludlow-Hewitt, Lieuts. E. O. Grenfell


Balloon Equipment Store Woolwich 1878
Balloon School and Factory at School of Military Engineering Chatham 1882
Balloon Section Royal Engineers 1890
Air Battalion Royal Engineers 1911
H.M. Balloon Factory
The Army Aircraft Factory
No. 1 Company (Lighter Than Air)
No. 2 Company (Heavier Than Air)
Royal Aircraft Factory
No. 1 Squadron
Royal Flying Corps Military Wing 1912
No. 3 Squadron
Royal Aircraft Establishment
No. 1 Fighter Squadron
Royal Air Force 1918

Military airship "Beta," 1910 to 1912. On this craft some of the very earliest air-to-ground wireless experiments were made. W/T over a range of more than 20 miles was achieved.

The airship "Delta" of 1912 was the first of No. 1's aircraft to be heavier than air. It had two swivelling airscrews which enabled her to fly while loaded to 500 lb heavier than air.



A Bleriot monoplane of the type with which No. 1 Squadron was equipped in its earliest "heavier than air" days. The Bleriot's all-up weight was under 1,000 lb, its maximum speed about 65 m.p.h. and its rate of climb 490 ft per min. The engine was a 50 h.p. Gnome.

(who commanded the squadron eight years later), V. A. Barrington-Kennett and O. M. Moullin. Flying their B.E.8s, and carrying 100-lb bombs, they bombed the railway bridge at the north-east corner of Douai, and the junction at Don. Apparently none of the bombs was effective, and Ludlow-Hewitt is reported to have hit the railway at Warrin, which he mistook for Don. Moullin failed to return and was later reported a prisoner of war.

At this period the squadron's main occupation was spotting for the artillery but, in addition, the pilots had to do their own fighting. For instance, after the squadron had been posted, on March 29th, 1915, to the airfield at Bailleul for duty with the 2nd Wing, they were required, by special request from Sir John French, the C.-in-C., to keep all German aircraft away from the Hill 60 area for a whole day before the attack on the Hill started in the evening of April 17th, 1915. The squadron was entirely successful, and the attack came as a complete surprise to the Germans. In addition, Major Salmond had been asked to make a special effort to spot the positions of enemy batteries by noting the guns' flashes. For this purpose No. 1 had eight aircraft continuously over the hill, and the positions of no fewer than 33 active gun pits were plotted. So effective was the squadron's work that an aircraft only had to appear in that area for the German artillery to cease fire. One of the main reasons for this was that Major Salmond and his squadron were the first unit to work out a system whereby artillery could be called from the air to fire on special targets as they presented themselves.

Reminiscence

That No. 1 was a top-notch squadron is borne out by Air Chief Marshal Sir Philip Joubert who, with the rank of Major, took over command of the squadron on August 15th, 1915. He has been kind enough to record for *Flight* some of his recollections of No. 1 as it was then. He writes: "I think what impressed me most first of all on joining the squadron was its efficiency and high morale. No. 1 was formed from Maitland's Airship Squadron and came under the command of Charles Longcroft, and he did a wonderful job. My three flight commanders could hardly have been more different in character and outlook. Sanders was very solemn, conscientious, hardworking and brave in a stolid way. Eustace Grenfell, dark, cheerful, irresponsible, liable to get into trouble at any time (he once was very near a Court Martial), but a fine pilot and leader. Micky Bell-Irving, fair, cheerful, intelligent and very courageous. The association between him and his faithful fitter Mumford was both interesting and amusing to watch. Mumford cared for him like a mother, and Micky's aircraft was nearly 100 per cent serviceable.

"One curious episode: C.C. Miles was flying his aircraft in low on a very bumpy day. As I watched him he got a tremendous kick under his left wing. I saw the rudder go over with a bang—about the best way of straightening out a Morane—and then the machine proceeded to make a slow, perfectly flat turn to the right, heading between two trees. When the crash seemed inevitable, Miles throttled down the Morane, went between the two trees, and he and his observer were rescued from the mess without very serious injuries. What had happened was that the fierce application of the rudder had bent the control king post, and thus there was no left rudder control at all.

The late Brig. Gen. E. M. Maitland, the squadron's first C.O.

"At this time No. 1 was almost the leading exponent in artillery observation, and Micky was our top-notcher. All the gunners competed for his services, and he had a happy way at the end of a shoot, when the enemy target had been suitably plastered, of pretending that he had been hit by the assiduous anti-aircraft that had been pursuing him for a couple of hours, doing a falling-leaf descent to have a look at the target he had been ranging on, and then flying home at no feet, shooting up the Boche trenches as he passed over them. We were a happy crowd, although somewhat mad, and perhaps it was symbolic that we were quartered in the Bailleul lunatic asylum."

About this time the Fokker monoplane became a considerable menace, and was being held only by the D.H.2 pusher biplane fighters. The French, however, produced the little Nieuport Scout (110 h.p. Le Rhone rotary engine) the performance of which was better than any other aircraft the belligerents were using at that period. The first of these aircraft to become available to the R.F.C., in March, 1916, were given to No. 1 and No. 11 Squadrons. From then onwards the Fokker menace gradually faded.

Up to this period the number of fatal accidents resulting from spins was probably the major cause of casualties in the Royal Flying Corps. Only one or two pilots had ever recovered an aircraft from a spin, and all that these could remember was that they had done everything wrong and the machine had stopped spinning. One of these pilots was Lt. Parke, R.N., who recovered while flying the enclosed Avro biplane at the Military Trials in 1912. For a while the spin became known as Parke's Dive.

No. 1 Squadron, however, late in 1916, had a pilot by the name of Capt. R. Balcombe-Brown—a New Zealander—who got in touch with Major Smith-Barry, the flying training authority in those days, and told him that he had discovered how to get into a spin as well as out of one. Major Smith-Barry laughed and said that a produced spin

could not be the true article—it had to be "an act of God." Nevertheless, by following the instructions of Capt. Balcombe-Brown, he found that he could start, continue or stop a spin at will. Capt. Balcombe-Brown was later killed in action.

The Squadron continued in the role of reconnaissance, artillery observation and army co-operation until January, 1917, when it turned its efforts solely to fighting. Not that No. 1's pilots were new to this sort of work, because they had already destroyed many enemy aircraft and observation balloons during the battle of the Somme which raged during the late summer and autumn of 1916.

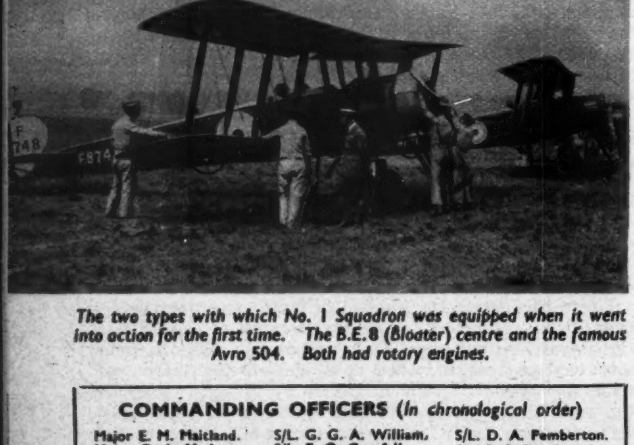
The next big show was the battle of Arras in April, 1917. Major Joubert had relinquished command of the unit to Major G. F. Pretyman who, in turn, had handed over to Major Dombasle. At long last the squadron was equipped with aircraft all of the same type. Still stationed at Bailleul, they had 18 Nieuport Scouts on charge. To open the battle there was an attempted offensive against the enemy kite balloons. As any 1914-18 war pilot will remember, these were very unpleasant targets to attack. The Germans were able to haul them down in an incredibly short space of time and, of course, had anti-aircraft guns and shells all set for the exact height and distance where the attacking aircraft would have to fly.

Then followed a period of most intense air fighting in which No. 1 Squadron, together with 49 other squadrons, met and fought the famous Richtofen Circus. With the exception of the Battle of Britain and Bomber Command's attack on Germany, this was probably the greatest series of air battles which have ever taken place. We suffered heavier casualties than the Germans, but the victory was ours and never again before the armistice in 1918 did the R.F.C. become so hard pressed. What mattered most was that during the whole battle the initiative never passed to the enemy.

Next followed the battles of Messines and Ypres, and it was during the latter, on the 9th of October, 1917, that the number of squadron successes attained since it became a fighter unit on February 15th of the same year, totalled 200. On this day (October 9th) one patrol of the squadron fought a formation of nine enemy fighters, destroying one and sending one down out of control. Another patrol in conflict with five German aircraft shot down two in flames and another out of control. The squadron lost one pilot missing and one wounded.

With the turn of the year, the squadron was re-equipped with the famous S.E.5A fighter. This was a great improvement. Over the Nieuport it had an extra 25 m.p.h. at 6,500ft and could get nearly 3,000ft higher. For comparison with the squadron's present-day equipment of Gloster Meteor 4s, here are some data of the 200 h.p. Wolseley Viper-engined S.E.5A: Speed at 6,500ft, 132 m.p.h.; climb to 15,000ft, 22.9 minutes; endurance 2¼ hours; service ceiling 20,000ft; all-up weight 2,048 lb; cost (airframe) £1,063 10s, (engine) £814.

In early 1915. A Martinsyde S1 at Bailleul. The squadron transport and the lunatic asylum billet are in the background.



The two types with which No. 1 Squadron was equipped when it went into action for the first time. The B.E.8 (Bloater) centre and the famous Avro 504. Both had rotary engines.

In a final effort, similar in many ways to the battle of the Bulge in the 1939-45 war, the Germans attempted a break-through in March, 1918, and No. 1 was one of many squadrons ordered to keep up intense low-flying operations to hamper the enemy's attack. Enemy air activity was on a small scale, and ground targets many. Fire from the ground was very intense.

On March 27th alone, in company with Nos. 19 and 20 Squadrons, No. 1 helped to drop 111 21-lb bombs on various targets on the hard pressed Third Army's front. To give some idea of the intensity of the fighting, the total number of rounds fired from aircraft against ground targets on March 27th was 313,345 in addition to 50 tons of bombs. In this connection it should be remembered that the heaviest bomb weighed only 112 lb and the great majority of them were only 21 lb each.

The final months of the 1914-18 war were spent in further air fighting, mostly while escorting day bombers over the lines.

During its active service in France from March 7th, 1915, to November 11th, 1918, No. 1 Squadron sustained the following casualties: Killed in action, 9; missing (reported or presumed dead), 40; missing (reported prisoners), 37; wounded in action, 29; accidentally killed, 8; accidentally injured, 18.

After its long stop at Bailleul the squadron was moved to Le Hameau for a short while before proceeding, at the end of February, 1919, to London Colney in Hertfordshire, in cadre form.

Disbanded at Uxbridge on January 20th, 1920, it re-formed at Risalpur, India, on the following day. From there, on May 20th, 1920, the squadron moved to Bangalore and a year later was posted to Iraq, arriving at Hinaidi via Baghdad. Here the unit stayed until in November, 1926, when it was again disbanded to be re-formed the next February at Tangmere, in Sussex.

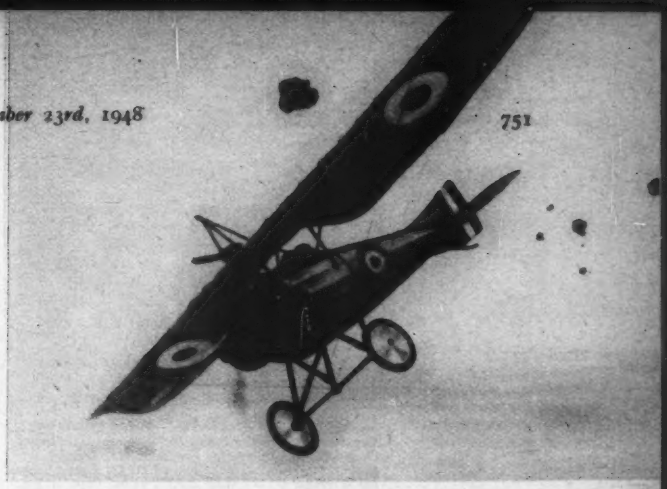
As mounts, the re-formed squadron was provided with A. W. Siskin 3As, the first all-metal fighter to go into service in the R.A.F., and No. 1's insignia will be remembered by many who attended the pre-war R.A.F. pageants and displays,

COMMANDING OFFICERS (*In chronological order*)

Major E. M. Maitland.	S/L. G. G. A. William.	S/L. D. A. Pemberton.
Major C. A. M. Longcroft.	S/L. E. O. Grenfell.	S/L. R. P. Brooker.
Major W. G. H. Salmond.	S/L. E. D. Atkinson.	S/L. J. A. F. Maclachlan.
Major P. B. Joubert de la Ferte.	S/L. C. N. Lowe.	S/L. R. C. Wilkinson.
Major C. F. Pretyman.	S/L. Luxmoore.	S/L. A. Zweigbergh.
Major C. C. St. P. de Bombasle.	S/L. E. D. Atkinson.	S/L. J. Checketts.
Major A. Barton Adams.	S/L. E. O. Grenfell.	S/L. M. P. Lardner-Burke.
Major W. E. Young.	S/L. C. B. S. Spackman.	S/L. D. G. Cox.
S/L. J. B. Graham.	S/L. R. W. Chappell.	S/L. R. S. Nash.
	S/L. C. W. Hill.	S/L. H. R. Allen.
	S/L. F. R. D. Swain.	S/L. C. H. Macfie.
	S/L. L. A. Bertram.	S/L. T. R. Burne.
	S/L. Halahan.	
	F/L. P. R. Walker.	

Seventy Years

A great favourite with the pilots, the little Nieuport Scout (1916-17), which had a very narrow chord lower plane. Armament was one .303 Lewis gun firing over the top plane.



One of No. 1's Morane "Parasols," used for Corps reconnaissance. With a 110 h.p. Le Rhone rotary engine, it had a top speed of 96 m.p.h. The black puffs are A.A. bursts.

particularly after 1931, when the squadron first had its much-beloved Hawker Fury biplanes.

With a second world war not very far away, the squadron was re-equipped with 8-gun Hurricanes in April, 1939, and had but five months with the new aircraft before proceeding to France as part of the Advanced Air Striking Force under Air Marshal A. S. Barratt (now Air Chief Marshal Sir Arthur Sheridan). S/L. Halahan was the commanding officer.

Then followed the dreary months of what became known as the "phoney war," but it was during this period that No. 1 scored another first. On October 20th, 1939, P/O. Mould shot down the first enemy aircraft (a Do. 17) to be destroyed on the Western Front. Yet another first scored in France by No. 1 was the shooting-down of the first Messerschmitt 110 on March 29th, 1940. Air Marshal Barratt had promised a dinner in Paris to the first pilots to do this, and F/L. Walker (who later commanded the squadron), F/O. Stratton and Sgt. Clowes were the recipients.

Arne . . .

For May 10th, 1940, the day on which the battle for France broke out, the page in the squadron's operational record books reads: "It has come today. For us war broke out and there is ceaseless activity. News and information give promise of momentous events. A patrol (F/L. Walker, F/O. M. H. Brown, F/O. Kilmartin, P/O. Richey and Sgt. Soper) accounted for a Do. 215 near Longuyon. Later in the morning F/L. Hanks and Lewis got a Do. 17. P/O. Mould and F/O. Drake each got an Me. 110." (Drake later became W/C., D.S.O., D.F.C. and bar and American D.F.C.)

Autograph Hunting

As written in the operational record book, the fight up to the time of France's capitulation appears as a very light-hearted account of what was, of course, a very bitter struggle. A typical passage, for May 14th, reads "Many people who for the past six months had been wearing spurs to keep their feet from slipping off their desks, moved with some alacrity. Wing headquarters retired in a cloud of dust due to bomb dropping. B Flight destroyed an He. 111 (F/L. Banks), F/O. Lorimer forced-landed at St. Loupeterrin. In an earlier engagement, Mould, Clisby and Goodman accounted for three He. 111s and two Me. 110s. Clisby landed beside one of the enemy aircraft shot down and chased the startled crew all over the countryside, waving a revolver. He wanted their autographs!"

With the fall of France at the end of June, No. 1 Squadron flew its remaining aircraft back to Tangmere from St. Nazaire airfield. The ground crews and staff sailed in two colliers to Plymouth and, after joining up again at Tangmere, the unit moved its headquarters to Northolt. All main equipment and documents had been lost in France; nevertheless the squadron was fully operational again very early in July, and night-flying training was re-commenced on an intensive scale. Whilst in France the squadron's scoreboard showed 155 enemy aircraft destroyed and 81 damaged.

The squadron's first interception in England was effected by Red Section (S/L. D. A. Pemberton, F/O. P. G. H. Matthews and P/O. D. O. M. Browne). An He. 111 was sighted 20 miles north of Brighton and engaged by P/O. Browne, who exhausted his ammunition but continued to shadow the enemy aircraft in order to advise its course through his "pip squeak." In doing so he was shot in the glycol tank. He brought his Hurricane down whilst on fire and extricated himself before the petrol tanks blew up. The Heinkel was damaged and subsequently shot down into the Channel by No. 43 Squadron, operating from Tangmere.

As the Battle of Britain became intensified, airfields such as Hawkinge, Tangmere, Manston and North Weald became forward landing grounds, and No. 1 and the other squadrons moved-in during the early morning and retired at dusk. The ground crews were moved by air.

For No. 1 the Battle of Britain can be said to have really started on August 11th, 1940, when its pilots shot down two Me. 110s. From then onwards the unit fought from dawn to dusk, taking its full share with the rest of Fighter Command in defeating Göring's *Luftwaffe*.

Page after page of the Operations Record Book is devoted to this classic air battle, and part of the report for August 16th follows: After describing the fighting in the morning, the report continues, "In the afternoon the squadron was engaged in its most successful action in England to date. S/L. Pemberton sighted enemy bombers, mainly Heinkel 111s, in three waves of about 40 each, stepped up. There were ten Messer-

The armament on a No. 1 Squadron S.E.5A at Clairmarais, 1918. The Lewis gun fired over the top plane and a Vickers through the airscrew.

S/L. E. O. Grenfell, who went on the squadron's first "op" in 1915, flying his A.W. Siskin 3A as commanding officer of the unit in 1928.

St. Omer, 1918 (S.E.5As). In the group are :
Capt. Clayson, M.C., D.F.C., Lt. Newman, Lt. Smart, Lt. Nesbit, Lt. Knight, Lt. Henderson, Lt. Crossley, Lt. Bellin, Lt. Mawby, Capt. Sison, M.C., Lt. Bigby, Capt. J. I. T. Jones, D.S.O., M.C., D.F.C., M.M., Capt. Lavers, Lt. Simpson, Padre Banks, Capt. Owen, D.F.C., Lt. Bateman, Lt. Kullberg, Lt. Forsyth, M.C.

Tangmere, 1938 (Furies). The ranks and initials not available :
(1) Brown, (2) Soper, (3) Drake, (4) Sanders, (5) Clowes, (6) S/L. Bertram, (7) "Pussy" Palmer, (8) "Prosser" Hanks, (9) Douglas, (10) Hancock, (11) Cuthbert, (12) "Johnny" Walker, (13) "Leaky" Crusoe.

Seventy Years Airborne . . .

schmitt 109s above the bombers, but they took no part in the action.

"In the first attack, from the beam and front, S/L. Pemberton brought down an He. 111 in flames by his first burst. His own engine caught fire, but before he decided to abandon his Hurricane the flames subsided and he landed safely. F/O. P. G. H. Matthews, who had followed his squadron leader in the initial attack, picked out one Messerschmitt 110 of a formation of five attacking a Hurricane and shot it down in flames. P/O. P. V. Boost had a bullet in his glycol tank and crash-landed on the Hog's Back. His aircraft was written off but he was uninjured. Sgt. A. V. Clowes, D.F.M., saw a Heinkel at which he had been firing go down in a vertical dive. After rejoining his formation he gave another burst to an He. 111 without result and then, dropping below cloud, saw a Junkers 88 which he attacked, firing one burst. Four Spitfires appeared, and the 88 dived down and crash-landed, without waiting for their fire.

"P/O. G. E. Goodman picked out a He. 111 after making the initial squadron attack. He put an engine out of commission with his first burst and saw the bomber crash near Petworth. While he was circling the crash at 500ft it blew up and his Hurricane was struck by a fragment, affecting his oil pressure. He returned safely to base.

"F/Sgt. F. G. Berry, D.F.M., during the squadron attack saw two of his targets break away from the formation and one of them dived vertically, obviously out of control.

"F/O. H. N. E. Salmon got left behind during the squadron attack, so he climbed to 22,000ft and dived on to the left wing of the bomber formation. Whilst doing so a Messerschmitt 110 came into view beneath him. His first burst of machine gun fire stopped the port engine and the Me. went into a vertical dive obviously out of control. He landed to refuel at Redhill and while on the ground was bombed by a Do. 17; he took-off again and landed at Norfholt.

"P/O. C. M. Stavert went with the squadron in its frontal attack. After diving through cloud he met a He. 111 head-on. He fired at it and the bomber dived vertically through the cloud. Stavert followed it through the cloud layer and saw the smoking remains of the aircraft immediately below him."

"The squadron therefore claim four He. 111s and one Ju. 88 destroyed. Two He. 111s probably destroyed. The squadron suffered the loss of one Hurricane only and no pilots."

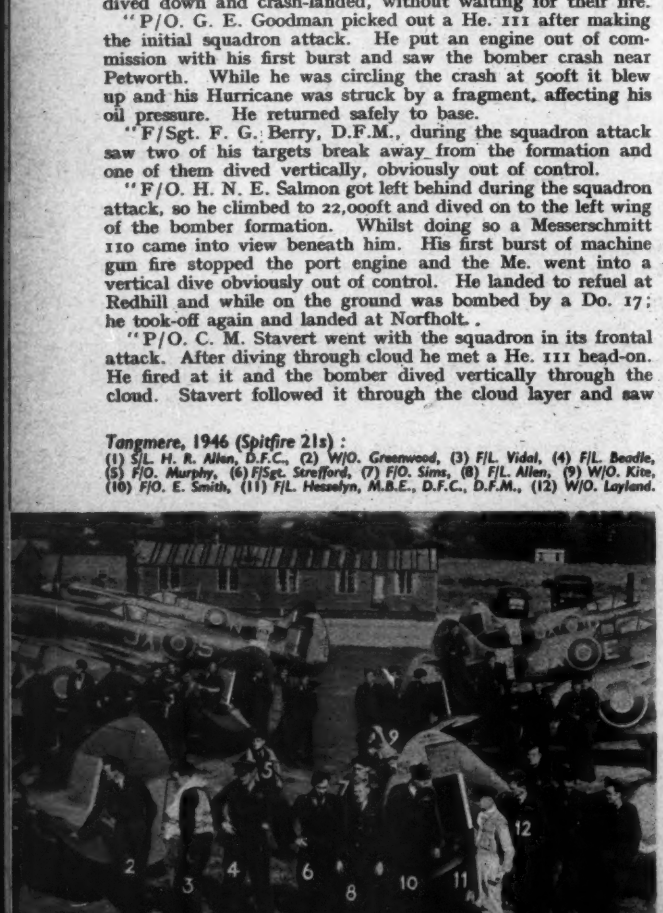
Operational record books of Fighter Command can produce reports like the above *ad infinitum*. Of such stuff is the R.A.F. made. S/L. Pemberton, who led this air battle, crashed and was killed on November 3rd, 1941.

With the daylight air battles over, No. 1 Squadron started "Fighter Night" operations. For a while it seemed as if nothing could stop the *Luftwaffe*. Anyone who heard the German bombers passing over at regular intervals for 14 hours to bomb Coventry, with scarcely any brought down, will remember the impotence which was felt at the time. However, we gradually got their measure, and the night of 10th-11th May marked the zenith of our night-fighting experience. It was the night on which the *Luftwaffe* set fire to the City of London, a large area east of St. Pauls being devastated. Over thirty German bombers were known to have been destroyed that night.

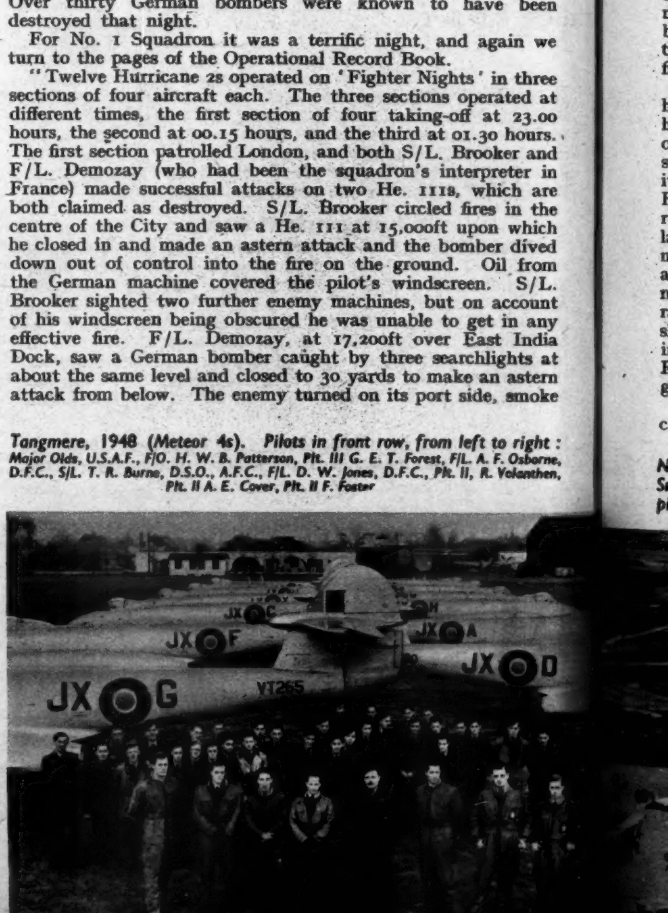
For No. 1 Squadron it was a terrific night, and again we turn to the pages of the Operational Record Book.

"Twelve Hurricane 2s operated on 'Fighter Nights' in three sections of four aircraft each. The three sections operated at different times, the first section of four taking-off at 23.00 hours, the second at 00.15 hours, and the third at 01.30 hours. The first section patrolled London, and both S/L. Brooker and F/L. Demozay (who had been the squadron's interpreter in France) made successful attacks on two He. 111s, which are both claimed as destroyed. S/L. Brooker circled fires in the centre of the City and saw a He. 111 at 15,000ft upon which he closed in and made an astern attack and the bomber dived down out of control into the fire on the ground. Oil from the German machine covered the pilot's windscreen. S/L. Brooker sighted two further enemy machines, but on account of his windscreen being obscured he was unable to get in any effective fire. F/L. Demozay, at 17,200ft over East India Dock, saw a German bomber caught by three searchlights at about the same level and closed to 30 yards to make an astern attack from below. The enemy turned on its port side, smoke

Tangmere, 1946 (Spitfire 21s) :
(1) S/L. H. R. Allen, D.F.C., (2) W/O. Greenwood, (3) F/L. Vidal, (4) F/L. Beadle, (5) F/O. Murphy, (6) F/Sgt. Strefford, (7) F/O. Sims, (8) F/L. Allen, (9) W/O. Kite, (10) F/O. E. Smith, (11) F/L. Hesselyn, M.B.E., D.F.C., D.F.M., (12) W/O. Layland.



Tangmere, 1948 (Meteor 4s). Pilots in front row, from left to right :
Major Olds, U.S.A.F., F/O. H. W. B. Patterson, Plt. III G. E. T. Forest, F/L. A. F. Osborne, D.F.C., S/L. T. R. Burne, D.S.O., A.F.C., F/L. D. W. Jones, D.F.C., Plt. II, R. Yelanthen, Plt. II A. E. Cover, Plt. II F. Foster



pouring from the port engine and dived to the ground. F/L. Demozay followed it down to 6,000ft and shortly afterwards saw an explosion on the ground.

"Of the second section Sgt. Dygryn was circling at 17,000ft anti-clockwise over London when he saw a twin-engined enemy aircraft parallel with him at about 500ft and slightly below. He turned left and gave a short burst at 50 yards range. The fire was returned without effect. Sgt. Dygryn gave another burst at 50 yards range and the bomber started returning fire but stopped suddenly. Our pilot then closed right in and fired a long burst. He overshot and broke away for a little while and then made another attack with a long deflection burst from the beam. The German rocked and started to dive, and, after Sgt. Dygryn had given a final burst, it went down and hit the ground. Sgt. Kratkorouky patrolling along the line of the Thames at 17,500ft saw another bomber approximately over Canvey Island on his port quarter and slightly above. He climbed and made a beam attack with a one-second burst, and the enemy dived down. Following up, Sgt. Kratkorouky gave him several further bursts from alternate quarter positions. He saw smoke coming from the port engine and then overshot, pulling out of his dive at about 500ft. He saw his adversary still diving at a height of about 2,000ft. S.W. of Southend. Sgt. Dygryn landed at 00.55 hours and Sgt. Kratkorouky at 01.50 hours.

"Third section. Sgt. Novak chased a Ju. 88 which he saw travelling North about 200 yards from him, at the same height. The Junkers opened fire without effect, and Sgt. Novak got into an attacking position, firing a three-second burst at close range from quarter astern. He saw his fire hitting the 88 and fired a second burst from dead astern as it was diving, but no definite results of this fire were seen. Sgt. Prihoda saw two He. 111s over London and had closed to 50-100 yards from one of them when A.A. bursts came up all round him and he was obliged to break off. He was at 10,000ft at this time. P/O. Behal crashed and was killed at Selsdon Park.

"In addition to 'Fighter Nights' operations, No. 1 Squadron also carried out patrols over base with eight aircraft.

"(A) Sgt. Dygryn (Czech) left Redhill at 01.35 hours and patrolled at 15,000ft. When over Kenley he saw a bomber, which he identified as an He. 111, slightly above him, going south; he turned to attack and gave chase. He then manœuvred into position and with a short burst attacked from beam position and above. The He. emitted black smoke which came over our pilot's cockpit and it subsequently burst into flames and went into a vertical spin out of control.

"(B) F/L. Jackman and P/O. Raymond left Redhill 02.25 hours to patrol at 15,000ft and saw immediately an He. 111 heading for London. He chased it for about three miles and opened fire from about 250 yards. The Heinkel went into a steep left-hand turn with a thin trail of smoke coming from it. Jackman then gave a third burst, and when at 9,000ft the He. 111 went into an almost vertical dive firing cannon from rear. It should have crashed 15-20 miles south of base. He landed base at 03.15 hours. P/O. Raymond was at 18,000ft north of base when he saw two combats going on below him and at the same time red tracer passed over him. P/O. Raymond turned toward the enemy and opened fire from close range from quarter astern, returning on other beam and slightly below to give another burst. The German disappeared in a steep dive and appeared to be out of control. P/O. Raymond then circled and from 2,000ft saw a large fire on the ground about 10 miles from base. Landed 03.35 hours.

"(C) F/O. Robinson took off 01.15 to patrol base; when circling south of base at 13,000ft flying west at 01.55 he saw an enemy aircraft approaching three o'clock, slightly above. It started to dive and take violent avoiding action. F/O. Robinson got in five short bursts at about 100 yards range, fire was seen to strike the fuselage and the German gave return fire in two short bursts and then stopped. He continued to dive but Robinson lost him against the dark ground at 7,000ft, but saw smoke coming from his engine, he was still diving earthwards and about 15-20 miles south of base. Later, having climbed to 13,000ft F/O. Robinson saw another bomber but it passed straight overhead and disappeared before he was able to get on its tail. Robinson landed at base 02.55 hours.

"(D) Sgt. Dygryn (Czech) left base 03.15 to patrol base. He saw a Ju. 88, N.E. of Biggin Hill, flying S.E. at 16,000ft. The Hurricane closed and attacked at point-blank range from dead astern firing all his ammunition in several long bursts. The Junkers was gradually losing height, with smoke coming from it. Sgt. Dygryn followed it over coast and saw it burst into flames and dive into the sea about 6-10 miles south of Hastings. Landed base 04.00 hours."

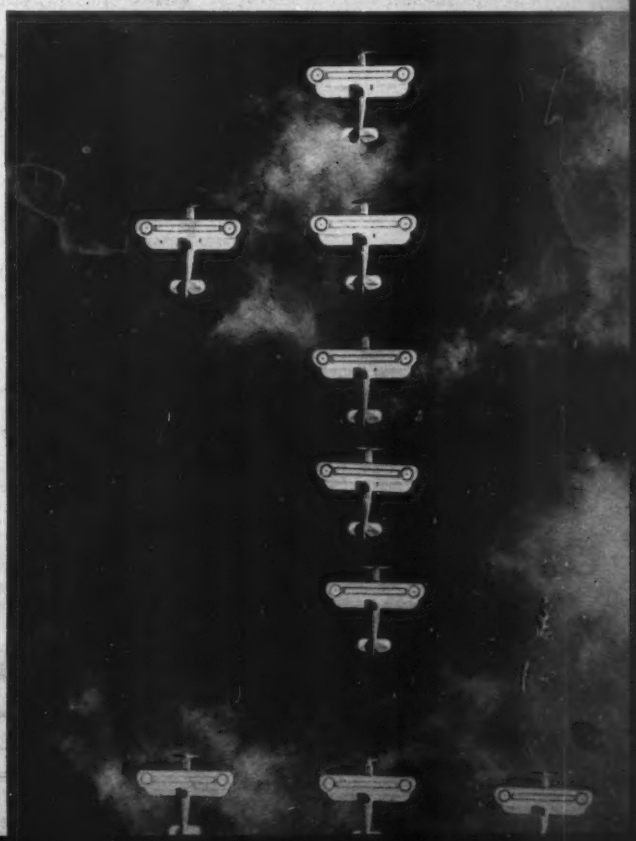
The next day the late Air Chief Marshal Sir Trafford Leigh-Mallory, then A.O.C. No. 11 Group, sent this message to S/L. Brooker, who commanded the squadron: "Heartiest congratulations, a fine performance of the whole squadron last night."

July, 1941, saw the squadron back at Tangmere, its pre-war home, and with cannon-armed Hurricane 2cs its duty was intruding and train busting. In the records the names of S/L. MacLachlan and Sgt.—later F/L. Kuttelwascher continually appear.

One such report reads: "1/5/42 F/L. Kuttelwascher on Hurricane 2c took off Tangmere 23.30 on intruder operation to Rennes. He flew a direct course at 5,000ft, coming down to 2,000ft over the French coast. Circled Rennes airfield at two miles radius. No activity so flew north and came back to east side of airfield. Saw two white lights and an enemy aircraft taking off with white navigation light in nose. Kuttelwascher manœuvred to get it between himself and the moon. Identifying it as a Do. 217, he closed to 150 yards range and fired three short bursts, and after the third the Dornier went down and exploded on the ground.

"Flying north to Dinard he saw another machine but lost sight of it. After waiting a further five minutes, however, he picked up a Heinkel 111 with full navigation lights on. These were switched off while it was still on the runway, but Kuttelwascher followed it and when it reached 1,000ft closed

No. 1. The squadron coaxes its Furies into the unit's numeral.



No. 1 in Iraq in the early "Twenties." The aircraft are Sopwith Snipes and Gayford, who is leading the formation, later, in 1927, piloted a Hawker Horsley non-stop from Cranwell to the Persian Gulf.

Vassincourt, France, 1940. Some of the officers of the squadron :
(Left to right) F/O. Drake, F/O. Clisby, F/O. Larimer F/L. Hanks, P/O. Mould, S/L. Halahan (C.O.), M. Demazay (Interpreter), F/L. Walker, F/L. Brown (Doctor), F/O. Richey, F/O. Kilmartin, F/O. Stretton, F/O. Palmer.

Night school. Pilots indulge in a game of cards in the crew-room of a dispersal hut :
(Left to right) Sgt. Prideaux-Brune, Sgt. Travis, Sgt. Smith, F/L. Crabb, P/O. Corbett, S/L. Maclachlan.

At Vassincourt, in 1939, the local French air force unit presented the squadron with a bottle of rum. The idea, a French practice in the 1914-18 war, was that any successful pilot should help himself to a tot and enter his victory. The top entry records the destruction of the first German aircraft to be shot down in France—a Do17 by P/O. Mould.

Seventy Years Airborne . . .

to 150 yards astern and attacked with two one-second bursts. A large piece of metal flew off the starboard engine and, after two further bursts, the Heinkel dived straight into the sea."

No. 1's train-busting efforts were equally successful, and by the time it moved from Tangmere to Acklington in September, 1942, there were 60 trains to its credit.

At Acklington the squadron was re-equipped with Hawker Typhoons, and on its first operation with the new aircraft scored yet another first. F/O. Perrin and P/O. Bridges destroyed the first two Messerschmitt 210s to be shot down over Britain.

During the whole period that elapsed between the end of night bombing in 1941 and D Day in June, 1944, in addition to the high-lights which have been described, No. 1 Squadron performed almost every operation which the wit of Higher Command could devise. *Turbinlights, Roadsteads, Ramrods, Rhubarbs* and *Rodeos* are but a selection and as D Day approached the tempo rose accordingly. On one *Roadstead* operation alone, against the *Scharnhorst, Gneisenau* and *Prinz Eugen*, the squadron lost a complete section. Eight days after D Day two pilots from the squadron (F/O. Stuart and F/O. Marsh) scored yet another first by being the first aircraft to land on the emergency airstrip laid just behind the newly won beachhead.

A few days afterwards there was a hurried move to Detling for *Divers* (V.1) patrols. By this time the Typhoons had given place to Spitfire 9s, and by using fuel of 150 octane and running their Merlins with +25 lb boost, the pilots were just able to intercept the flying bombs. F/O. Bridgman was the first pilot of No. 1 to be successful—he shot one down 12 miles south of Tonbridge. Judged by his A.S.I., the flying bomb was doing 360-375 m.p.h. By June 30th, 1944, the pilots were more adept—No. 1 got seven V.1s in that day alone. F/Sgt. Hastings finished one attack on July 5th on the fringe of the London balloon barrage. He fouled one of the cables, which took off his starboard wing-tip and two airscrew blades. Despite this he managed to land his aircraft intact at Gatwick. Altogether No. 1 Squadron destroyed 39 flying bombs.

By the middle of August, 1944, the A.A. guns largely had the measure of the flying bombs, and No. 1 Squadron, now with Griffon-engined Spitfire 21s, took on more bomber-escort work on daylight raids. Frequently two shows a day were being put in, and this duty was carried on right up to the close of hostilities in Europe.

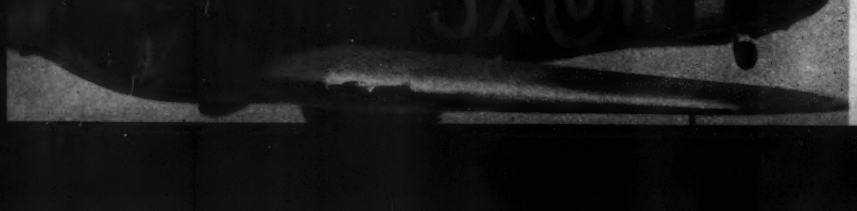
After short stays at various locations, No. 1 again found itself back home at Tangmere and, in October, 1946, was re-equipped again, this time with Gloster Meteor 3s.

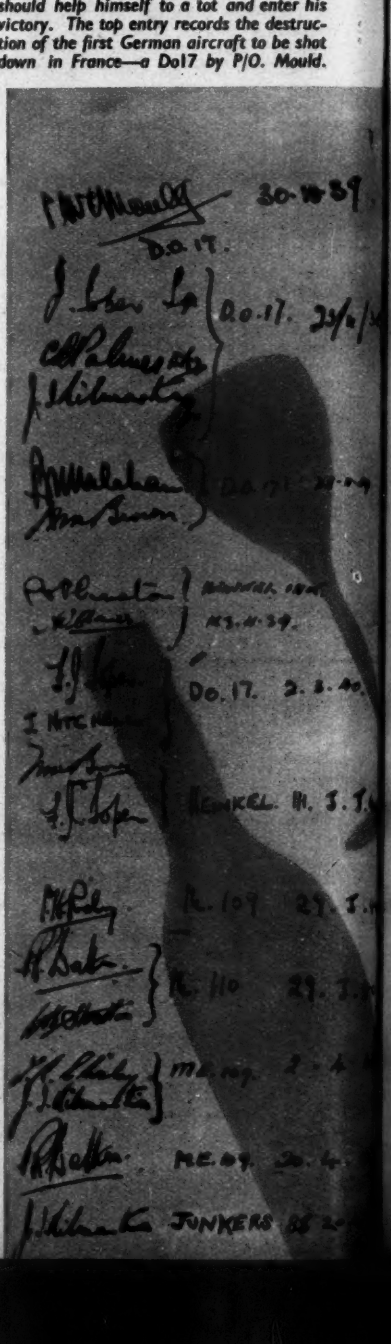
On May 1st, 1947, the squadron went to Lübeck for air exercises, and on its return at the end of June S/L. T. R. Burne, D.S.O., A.F.C., the present C.O., assumed command.

Then in August, last year, came a bombshell, and here follows a quotation from the squadron "Line Book." "And then alackaday *Very Terrible Things Happened*. In all haste we point out that S/L. Burne was not responsible for them. Our role as *The* fighter squadron came to a shuddering halt. Our Meteors and aircrews were given to Nos. 222 and 266 Squadrons, and we were re-equipped with Harvards and Oxfords and told to teach all the squadrons in No. 11 Group 'How to Fly on Instruments'."

In June of this year, however, No. 1 happily reverted once more to its famous role of *The* fighter squadron and was re-equipped with Gloster Meteor 4s.

Eight-gun, twelve-gun and four-cannon Hurricanes were all used by No. 1 Squadron in the period from April 1939 to September 1942. This Hurricane 2c was flown by Sgt. Scott.





MANNING THE R.A.F.

The Service, the Nation and the Government

By
AIR CHIEF MARSHAL SIR PHILIP JOUBERT,
K.C.B., C.M.G., D.S.O., R.A.F. (Retired)

IN my article in the December 9th issue of *Flight* I endeavoured to set out the reasons which, in my opinion, would account for the present decadence of the Royal Air Force, and the measures that it would be necessary to put into execution before efficiency and contentment could once more be restored to the Service.

It was not possible, within the scope that was allowed me, to deal with certain broader aspects of the present troublesome situation. These are now considered in this article, and though I am speaking for the R.A.F. in particular, much of what I say is applicable to the other Services.

But before I start to discuss these aspects I want to make clear my views on another matter. The authorities at the Air Ministry have quoted the results of the Berlin Air Lift to support the official view that the morale and discipline of the Royal Air Force are as good as they ever were. My reply to this is that, first of all, *the morale of the aircrews has never been in doubt.* It has always been good. As regards the ground crews on the Air Lift, the results achieved merely go to show how a man-sized job of work with visible signs of achievement at the other end of it will engage the whole-hearted interest of Britishers, even when they are full of discontent. There is no doubt also that the Lift is proving a very good training school for inexperienced airmen, in the air and on the ground, and to this extent it is of great benefit to the Service. It is an "operation," and "ops" always arouse enthusiasm. But sooner or later, the boredom of routine will set in, and then the old grievances will re-emerge in greater strength than before. In addition, the extensive "bleeding" of home units to maintain the Lift puts them in worse case than before.

It might be fair to say that Bomber Command's misfortunes in the operations against the Fleet in the recent exercise are in some respects attributable to this "bleeding." So what we gain on the Berlin "roundabout" we lose on the Atlantic "swing."

And when it is said that the discipline of the Air Force is as good as it ever was, I beg leave to differ. A simple comparison between 1913, 1938 and our present state satisfies me on that count.

Putting Pressure on the Government

Turning to a more general consideration of the problem, it has been said that a nation gets the Government it deserves. The same truth applies to the Services. If a nation wants good and efficient armed forces to protect its interests, it can get them by putting pressure on the Government. In the early 1900's the Navy League, with great public support, invented the slogan "We want eight and we won't wait." That was an almost nation-wide campaign for a stronger force of battleships, and the League got them!

The nation must also be prepared to pay adequately for these forces, and to show pride and interest in their performance and their welfare.

In the past, though perhaps less so to-day, it is fair to say that the majority of the British nation regarded the armed forces as nothing but an expensive, though necessary, nuisance. I am reminded of a Yorkshire lady upon whom I billeted some troops in 1916. "My, my!" she said, "Sodgers in the house! We 'ave coom down in the world!" We have advanced since that day—but not much.

The feeling that a man goes into the Services because he is no good at anything else, and that soldiery must, of necessity, be brutal and licentious, dies very hard in a country which has always, as a first economy, cut its military budgets. The United Kingdom has not been occupied by an enemy for so long that the touching faith and pride that fill a citizen of Europe when he regards the armed forces of his nation are almost totally absent. The "argumentum ad-hominem" is lacking!

Becoming Defence-minded

Nine years of hot and cold war have, of course, to be paid for in terms of indifference to military matters. Let us but once again become comfortable and prosperous, and that indifference may become active dislike. It is, perhaps, fortunate that under our present régime of austerity, combined with a lack of financial common sense, we are likely to be neither comfortable nor prosperous, and the sheer necessity for facing Russian aggression with adequate defence may persuade the nation soon to take a real interest in the Services. But it will need better propaganda on the part of our Minister of Defence than has been apparent up to date to achieve this end. Indeed, we are in a vicious circle. National indifference persuades the Government that there is little support for the policy of creating effective armed forces, and the Cabinet fears this indifference and the difficulty of arousing the nation from its lethargy. Only the imminence of war will alter this, and then it will be too late.

In addition to this attitude of indifference and the difficulty of the singular fallacy that the profession of arms is limited, so far as the officers are concerned, to the wealthy classes.

This was certainly the case up to 1914. When I joined the Army, quite a high percentage of officers had private means, and many were encouraged to leave the Army by the grant of a pension after fifteen years' service, so that they could look after their properties.

Two devastating wars have practically eliminated this class, and there must be very few parents to-day who can give their sons even a small allowance when they are commissioned. In other words, nearly every officer has not only to live on his pay, but must endeavour to save to eke out the small pension that he will earn, after prolonged service to an ungrateful country. It is a fact that on the present rates of pay and allowances an officer, whether married or single, can barely exist. As for saving, that is almost an impossibility.

Some thirty years ago, the fact that military men ran risks in their profession greater than the ordinary civilian in his, and took the first brunt of war, was tacitly recognized by the grant of certain privileges. Amongst these were long periods of leave with pay, the allotment of a full-time servant to each officer, and marriage and other allowances that were untaxed. To-day, practically every privilege has been whittled away, the last to go being the untaxed marriage allowance. The Service man has been brought on a dead level with his civilian opposite number. Specifically, the pay of the R.A.F. has been cruelly slashed, particularly in the lower ranks.

When I joined the R.F.C. in 1912 I was paid a golden sovereign a day and I lived like a prince.

After 1914-18 Lord Trenchard expressed his regret that he had been unable to obtain for the Royal Air Force the rates of pay which he considered suitable. I seem to remember that a pilot officer received 12s 6d a day instead of the £1 previously drawn, and that to meet a much increased cost of living.

We got through the awkward period after 1919 by reason of Lord Trenchard's wise administration, by our ability to give a good youngster a real career following on a three

(*Continued on page 761.*)

PER ARDUA AD CUMULI

Specially Designed Glider Winch at Redhill

By F. G. IRVING

LAST year, it became manifest to members of the Surrey Gliding Club that those who indulge in motorless flight really need an exhaustive knowledge of engines, for the standard post-breakfast ceremony of persuading the winch to work required considerable art. Both winches were of the traditional modified motor-car variety, and combined all the standard idiosyncrasies of cars with a few of their own. The more de luxe machine started life as a very superior Rolls-Royce untold years ago. A drum, driven from the transmission shaft, was fitted in front of the differential, and the cable passed over a pulley at the top of an erection like an oil-well derrick bolted to the chassis. This device was all very well in theory, but in practice, apart from almost hurling the driver from the seat at the start of a launch, caused an excessive amount of cable-wear. And steel aircraft cable is quite expensive. The French would justly term the engine "formidable." Nobody quite understood it, but it was said that if reluctant to start, a half-crown cunningly inserted in the carburettor worked wonders. Being a Rolls, a penny was by no means as efficacious. Apart from that, it had a fiendish cockpit drill, involving much twiddling of taps, pumping, priming and more twiddling.

The other machine was Imperial College's de Soto, 1927 vintage, a machine of greater reliability but much less urge. Even so, it did about 3,500 launches. Its appearance tended to discourage the would-be glider-driver, being rather *à la* Heath Robinson, but it had many virtues. The chief of these was the speed at which the cable could be taken back to the launching point. The only limit to this was the speed at which it was safe to drive a Beaverette over the airfield.

By the end of last year, the Rolls had been retired as causing too much cable wear, and the de Soto was showing excessive signs of decay. So the C.F.I., Lorne Welch, took thought and designed a new winch.

It was felt that the specification for the ideal winch was roughly as follows:—

(a) It should be self-mobile. The ideal arrangement would probably be a winch mounted on a lorry chassis, driven from the engine via a power take-off from the gear box. A separate engine for the winch would not be economical.

(b) Plenty of power is essential. Most converted motor-car winches are rather lacking in this respect, and it is a little disconcerting if the engine stalls at the wrong moment. The wrong moment is when you are about 100ft up, with the nose pointing upwards at 45° and with rather fewer m.p.h. on the clock. What is wanted is enough urge to launch 1,000 lb of two-seater in no wind. A Ford V-8 is by no means too big.

(c) The whole affair should only need one man to operate it. This means having all controls ready to hand in the cab, and, if possible, a telephone to the launching point.

(d) Coming down to details, an automatic feed-on for laying the cable smoothly on the drum is vital. The considerable extra complication is well worth while on account of the saving in cable wear and breakage. Another way of saving wear is to keep the moment of inertia of the rollers over which the cable passes to a minimum, and to keep the number of rollers down to one mounted horizontally, and two vertically.

(e) A completely reliable method of chopping the cable in emergency should be fitted. The traditional method of having a man standing by with an axe is uncertain and unsafe (for the man as well as the pilot).

(f) The driver should be as comfortable as possible, in a cab giving all-round visibility but protected from having the cable dropped on it by pilots trying to squeeze the last inch out of the launch. Few things are more discouraging to winch drivers than being the target for 1,000ft of steel cable. The winch machinery should also be well protected, so that if the cable breaks, the whirling end doesn't chew up innocent onlookers. Likewise the immediate surroundings of the drum should be as free from projections as possible, so that if loose loops of cable form on the drum when the cable is being pulled out, they will not tend to catch and break.

So much for the specification. We had a balloon winch, and it was obvious that a half-hearted conversion would not suffice. The whole thing had to be taken to bits, and then, armed with its engine, gear box and a lot of very substantial steel, it could be completely reorganized. Having consumed innumerable cigarettes in the small hours, and having held various hilarious mock-up conferences, the C.F.I. eventually produced his *magnum opus*. With only little modification the winch was duly built by a local firm of engineers. It does not quite fulfil the above specification, mainly in so far as it is not self mobile. It is a trailer, which is raised on a two-legged frame at one end and a jack at the other. This takes nearly all the weight off the springs so that it stands really firmly when in use. The jack unfortunately needs 250 turns to lower it and is rather too reminiscent of an Anson's undercarriage.

The new glider winch in action at Redhill airfield.

The Ford V-8 engine drives the drum, which can take 6,000ft or 15 cwt 7 × 19 aircraft cable, through an ordinary four-speed gear box. Third gear is used for light winds and second when launching in a stiff breeze.

The feed-on device consists of a left- and right-hand screw driven by a chain from a sprocket on the drum axle. This screw moves an assembly consisting of two vertical rollers which guide the cable on to the drum, and mounted behind the rollers is a large chisel, normally held up by a light spring. To reduce inertia, the "rollers" are actually stacks of ball races, clamped together with thin shims between the inner races. Their hard outer surface is also a great advantage. The chisel is for emergency

cable-chopping, and is operated by pulling a cord in the cab (penalty for improper use £5). This releases a piece of 6in by 3in channel, pivoted at one end, which acts as the hammer. So far, it has not been used in earnest, but on test has been most effective.

The cab is protected by wire mesh, and the driver sits with the drum on his right and the engine on his left. The throttle and other engine controls are also on his left, together with the gear lever, brake and chopper release. On his right is the clutch lever. A telephone and signalling lamp are provided.

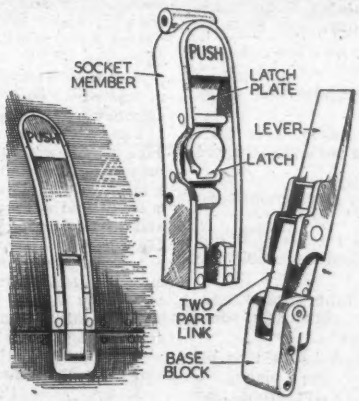
After a few slight mods., the design proved to be most satisfactory. Using rather less than 3,000ft of cable, in a light wind an Olympia can be launched consistently to 750 or 800ft. In a breeze strong enough to discourage the local Tiger Moths, 1,000ft is the order of the day, and in a really good wind 1,200 or even 1,400ft has been obtained. Apart from pouring in the appropriate fluids, little maintenance has been needed, and cable-wear seems reasonable. There have been practically no snags so far as the basic design of the winch is concerned, except that second gear is a little too low and the brake can be rather tricky. It should be explained that the brake is lightly applied whilst the cable is being towed out to the launching point to damp out surging and to prevent the drum over-running. Most cable-breaks have been due to this brake having been used too frequently. As a trailer, it is a little unwieldly, weighing rather over 1¼ tons, but stiffening the springs has helped to make it behave fairly well on tow.

Having the motive power on the ground instead of in the aircraft introduces a number of peculiar problems, but this type of winch, one of the few in this country to be designed specifically for the job, seems to provide the answer to most of them.

KING FASTENER

THE requirement for cowling fasteners which are simple in operation, positive in action and do not cause disruption in skin contour, has been made the subject of a Ministry of Supply specification. Many of the larger aircraft manufacturing companies do, of course, fit cowling fasteners of their own design, but there are other concerns who manufacture proprietary designs of toggle fastener, among them the King Aircraft Corporation, of Hillington, Glasgow. Of the eight makes of fastener presented for official examination, that made by King Aircraft was deemed to have the greatest number of desirable features.

The accompanying sketches illustrate the external appearance of the fastener as fitted to a cowling and also show the respective parts in such a manner as clearly to indicate the method of operation. The central sketch shows the socket element, whilst the right sketch shows the inside of the lever unit, the hooked feet of which fit over the shoulders in the base of the socket member. The latch mechanism consists of a pivoted latch plate embossed "PUSH" and extended by a coil spring to maintain it in the locking position: the latch itself engages with the upper pin spanning the walls of the hooked lever. Pivoted between the hooking feet of the lever is a two-part link, the lower half of which is in turn pivoted in the head of the base block. The two parts of the connecting link are spigot-screwed together in order to provide some latitude of adjustment between the parts of the cowling the fastener is intended to unite. As may be seen, this fastener provides a positive lock and smooth exterior.



BEECHCRAFT 45 TRAINER

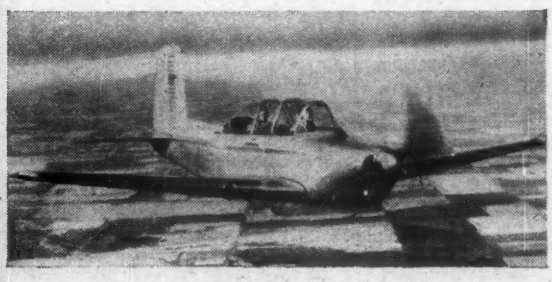
THERE is something distinctly British about the conception of the new Beechcraft Model 45 which was announced very recently. American trainers have tended in the main to be more powerful and more elaborate than their counterparts in Europe; however, in this case a very clean and simple tandem monoplane with 185 h.p. Continental engine is introduced.

The particular talking points are said to be its lively performance coupled with exceptional running economy and low cost of maintenance. Purchase price is to be reasonable as well. The name of Mentor, already used by the Miles company in this country, has been given to the Beech 45, which is a development from, and has many points, other than its butterfly tail, in common with the Bonanza. The Beech Aircraft Corporation of Kansas describe their venture as a "primary and basic advanced trainer," which is possibly intended to indicate extreme versatility but which runs the risk of being interpreted as inability to make up their minds as to what niche this new trainer would best fill. Nevertheless, with the rather limited information at present available, the Mentor appears to be an attractive proposition in the basic (British definition) two-seater class.

It is of all-metal construction with retractable undercarriage, and has been designed with a load factor of 10. It is said to offer strength unmatched by other competitive aircraft. Beechcraft's chief pilot said after its first test flight at Wichita on December 2nd that the Mentor was very stable in all planes, had the characteristics to make a good trainer and offered comfort and excellent visibility from either seat. Details of equipment have not been stated.

Dimensions and performance are as follows:—

Gross weight	2,650 lb.
Top speed at sea level	176 m.p.h.
Cruising speed at 10,000 feet at 61 per cent power	160 m.p.h.
Maximum dive speed	280 m.p.h.
Landing speed (with full flap)	56 m.p.h.
Initial rate of climb	925 ft/min.
Service ceiling	18,000 ft.
Cruising range	634 miles.
Fuel consumption	10 g.p.h.
Take-off over 50 feet (zero wind, S.L., off grass)	435 yards.
Landing run over 50 feet (zero wind)	250 yards.



This illustration of the Beechcraft 45 emphasizes the excellent view enjoyed by both pilots.

METEOROLOGICAL HANDBOOK

The Meteorological Office has published a handbook of weather messages, codes and specifications to replace the pre-war publication Wireless Weather Messages. Full details are included of the code forms to be used for weather messages as from January 1st, 1949, together with tables of specifications for individual weather elements.

Separate chapters are devoted to surface reports, upper air reports, reports from aircraft, forecast codes and the international analysis code, and the meteorological section of the Q code is reproduced. The handbook is published by H.M. Stationery Office.

INTREPID BIRDMAN

I'LL take three hours in the dentist's waiting-room, with four cavities and an impacted wisdom tooth, in preference to 15 minutes at any airport, waiting to get into an aircraft.

You may class this as hysteria, you may regard it as ungenerous criticism of a system of transportation that has established itself as the fastest, safest and most convenient in the world. But where airplanes are concerned I'm a case for quiet conditions in the padded room.

I'm all right at the terminus; indeed, when I see people queueing at counters labelled "New York," "Chungking" and "Bermuda," I feel a certain regret that I, too, am not bound for similar romantic destinations. But the urge for far-flung travel evaporates as soon as I get into the airport bus.

The first thing I do in the bus is to look round at the other passengers to see if they are the kind of people with whom I should be content to die. They always, for some reason, fail to measure up to my standards. By the time we arrive at the airport, I have lost about a pound in weight.

At the airport I try to fall into conversation with the pilot or some member of the crew. I have a number of questions to ask—apparently offhand, casual questions, but they go to the root of the matter.

I wish to ask the pilot:

1. Are the very best engineers even now checking every inch of our aircraft?
2. Have you, or any member of your family, ever been subject to giddiness, loss of memory, or nervous attacks?
3. Are you going to drive it very fast?
4. Will it be necessary for us to travel at much more than 50 feet above the ground?

To the radio operator: Can you, even if they send it out very quickly, be perfectly sure of understanding the Morse code?

And finally, to the air hostess: If anything goes wrong, would you be so kind as to inform me personally, some time in advance of the other passengers?

Reassured about these matters—and I must admit that all aircrews are immensely reassuring—I enter the 'plane. I cannot decide whether it is better to sit in the front and bear the full brunt of the impact, or in the back and run the risk of being carried away when the tail unit falls off. I choose a central position, where I can watch the wings and see that the propellers are going round.

Five minutes after we are airborne, I disentangle my fingernails from the upholstery of the seat and release the safety belt which I had drawn so tight that it stopped my breathing. I sit back to enjoy the cloud panorama.

The door of the pilot's cabin opens—and the pilot himself comes out! What recklessness is this? He has left some half-fledged boy at the wheel! I watch with horror as he strolls down the aisle, chatting easily with the other passengers. I know what he's doing. He's telling them it's all right. Both engines have fallen off, but he's telling them it's all right.

When my turn comes, the pilot says: "Good morning—are you having a pleasant trip?" I merely nod, speechless. All I want him to do is to get back to his work and remove that mad office boy from the controls. I relax again as he shuts the door of his cabin behind him.

An hour goes by. I had a bad moment when the hostess leaned over and said something I was unable to hear. It sounded like "We are falling into the sea." I was halfway out of my seat when I realized she was asking me if I would like some tea.

Suddenly we are losing altitude. I look down and the earth is carpeted with railway lines, red-brick houses, factory chimneys and telegraph poles. This is it.

The percussion valve in the port cylinder has blown out. This is the emergency landing. I sink the old nails right back into the upholstery and close my eyes. There is a bump, a faint screech—we have gone through a cow?—and then all is silent and still. We are alive, but where? I open my eyes, and we are sitting on the apron outside the terminal building. They are pushing up a ladder to the door.

I leave the plane with a slight swagger. A lot of open-mouthed sightseers are standing behind the railings. Well may they stare. They are looking at one of the intrepid birdmen of the modern era—in Dublin, a little more than an hour ago; now, as large as life, at Northolt airport.

What I say is that the airplane provides the safest, fastest and most convenient means of travel in the world.

Patrick Campbell, in the *Sunday Dispatch*.

U.S. "TURBO-GENERATOR"

A SMALL gas turbine for producing auxiliary electric power has been produced by the Solar Aircraft Company of San Diego. Advantages suggested by this new application of jet propulsion, in comparison with piston engines used for the same purpose, are the increased altitude at which such a unit would maintain power, and its lighter construction.

Length of the model 80, as the Solar product is designated, is quoted as 52in, and weight 360 lb. Its normal maximum power rating is 50 kW up to 40,000ft, with a five-minute overload rating of 75 kW.

Precise details of the unit's operation are not available, although it will be seen from the illustration that the products of combustion in four combustion chambers are directed to twin turbine and exhaust nozzle assemblies through turbo-supercharger type manifolds. Air is apparently drawn in through a peripheral intake to an axial-flow compressor, and taken forward to a centrifugal impellor, which feeds the combustion chambers. The main shafts from the two turbines are geared to drive the generator, mounted on a single common gearcase.

The company's previous experience in the manufacture of exhaust manifolds and association with turbo-blowers probably accounts for the turbine and discharge assembly design.

Three-quarter rear view of the Solar Model 80 gas turbine generator.

THE MARCH OF CLIMB

EVEN the most knowledgeable spectators at the S.B.A.C. flying display at Farnborough this year, who saw the climbs of the Meteor 4 powered with Metropolitan-Vickers Beryls, were considerably impressed at the vertical rate of progress. Just how fast this version of the Meteor does climb, however, has not been available for publication until now; the figures are almost fantastic. These climbs were made in October this year, during the Gloster Aircraft Company's handling trials of the aircraft at Moreton Valence, the machine being flown by S/L. J. Zurakowski.

Time min	sec	to	Height feet
0	55	.....	10,000
1	35	.....	15,000
2	5	.....	20,000
2	50	.....	25,000
3	43	.....	30,000
5	55	.....	35,000
7	31	.....	40,000

Prior to these flight trials, the Beryls were checked in the aircraft as each giving 3,950 lb static thrust at 7,750 r.p.m. At no time during the climbs did the jet-pipe temperature exceed 725 deg C. (the maximum permissible is 730 deg C.) and at no time did the r.p.m. exceed 7,700. The Beryl-Meteor 4 has an all-up weight of 15,455 lb, and is thus some 255 lb heavier than the standard Meteor 4 powered with Derwent 5s. Nevertheless, the Beryls push the Meteor up to 30,000 and 40,000 ft in *under half* the time taken to reach these heights by the standard Derwent-Meteor which requires 8 minutes and 17 minutes respectively to attain these altitudes.

Powered Controls

Exposition of Current Ideas on the Use of Powered Flying Controls of Various Types

IN our last week's issue, we included a brief résumé of the paper *Present Thoughts on the Use of Powered Flying Controls in Aircraft*, read before the Royal Aeronautical Society by the author, Mr. D. J. Lyons, B.Sc., A.F.R.Ae.S., on December 16th. The author is the Principal Scientific Officer, Aerodynamic Flight Section, Royal Aircraft Establishment, and, by virtue of the specialized study he has made of the subject is, perhaps, the most highly qualified person in this country to deal with powered controls as a lecture subject.

Great ingenuity has been expended in developing various kinds of fixed aerodynamic balance to lighten the increased control hinge moments which have arisen from growing sizes of aircraft and controls, increased flight speeds and increased demands for manœuvrability. In practice, it is essential to allow for certain variations in the value of b_2 (where b_2 is the rate of change of control hinge moment coefficient with control angle), the most important of which are those due to (i) different flight conditions and control deflections, (ii) manufacturing tolerances, and (iii) ice accretion.

These variations tend to cause overbalance of control either in prototype or production testing, and experience has shown that the value of $-Kb_2$ for any such control (where K is a motor representing aircraft response effects) should be greater than 0.035 to avoid overbalance due to manufacturing tolerances only, greater than 0.08 to avoid overbalance due to the combination of ice accretion and manufacturing tolerances, and greater than 0.12 to avoid difficulty in design and to give reasonable repeatability on the production line without individual adjustment.

The curve shown in Fig. 1 relates to the top manœuvring speed of a typical fighter to the design value of Kb_2 necessary to obtain a certain aileron performance. The dimensions (based on the Meteor) are assumed constant, and the actual conditions assumed are 15 deg of aileron applied at top speed for 50 lb stick force. On these assumptions design would become difficult with a top speed of 230 m.p.h. and serious risk of over-balance would occur with a top speed above 420 m.p.h.

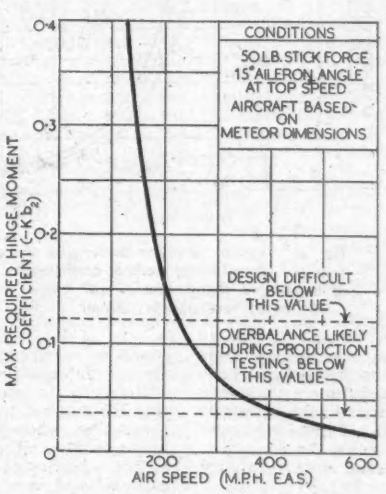


Fig. 1. Curve showing variation with top speed of the required control hinge moment coefficient on the aileron control of a typical fighter.

After surveying the main parameters of aerodynamic servo controls, Mr. Lyons went on to observe that the main problem with fixed, aerodynamically balanced controls is whether the operating loads to the pilot can be reduced to a sufficient degree, whereas with a servo tab system the question is whether the tab, upon which reliance is placed, can be guaranteed to produce power to move the main controls in certain critical conditions. With powered flying controls neither of these problems causes as much worry but, instead, there exist the more mechanical problems of producing a stable, non-oscillating power system which requires very small parasitic forces to operate it and, in addition, the ensurance of good reliability with sound reversionary schemes to cope with the emergency resulting from any likely form of failure in the power system.

If manual reversion is accepted as the recognized escape in the event of any failure in the main powered flying control system, it must be ensured that the loads which the pilot can exert are enough, when manual operation is being used, to enable the aircraft to return to its base and land. In addition, at the moment of change-over from the failed power system to the manual operation, the pilot must be able to control the aircraft satisfactorily.

Even at the lower speeds, manual reversion is not without difficulty, as shown in Fig. 2. It is demonstrated that design for these emergency conditions would become difficult (i.e., $-Kb_2 < 0.12$) for aircraft with spans above about 150ft. It is not considered likely that manual reversion can be used to the satisfaction of pilots with conventionally proportioned aircraft having spans above 150ft to 200ft. Thus, as seen at present, if powered controls are used on aircraft above these limits, a fully duplicated system should be used.

There is no fundamental reason why duplicated powered controls should not be used in cases where manual reversion is practicable; but it would appear wise to rely on manual reversion in the emergency case as often as possible.

The pilot requires some forces on the cockpit control, or "feel," to give him some idea of the position of his controls and to return a control to the trimmed position on release, but the layout of the complete powered control system has to be altered according to which method is employed.

When proportional feed-back of hinge moment is used to give "feel," the control forces are trimmed out by the pilot with the normal trimmers. If reversion action takes place when the pilot has a load on the cockpit controls, and the resultant load on the control, i.e.,

$$\frac{\text{out of trim load with power on}}{\text{proportion of feed-back}}$$

is too much for the pilot to hold, the ensuing motion of the aircraft is the same as if he released his controls before the power was switched off with the same trimmed conditions. Unfortunately, the friction in the control circuit between pilot and powered control unit may be holding a load on the control surface up to the

$$\frac{\text{limiting friction}}{\text{proportion of feed-back}}$$

which the pilot will have to hold himself on reversion.

It is thought at present that the best compromise is to base a requirement on friction grounds alone by stating that the proportion of feed-back must be greater than

$$\frac{\text{the control circuit friction}}{\text{the maximum sudden load the pilot can be expected to hold.}}$$

Examples of this value for an aircraft with wheel control are 80 lb for the aileron, 110 lb for the elevator and 200 lb for the rudder.

When completely artificial "feel" is used, there is no direct and simple relation between the hinge moment held by the powered control unit and the cockpit control loads. This is immaterial when the power is on, so long as the artificial feel is adjusted to suit the aircraft.

It is believed that the best solution is to provide continuous automatic trimming-out of the control surface hinge moments by means of tabs whether the power is on or off. The hinge moment on the control is measured mechanically by the deflection of a spring: when the load and, therefore, the deflection exceeds a given amount, a switch is made which allows current to pass to an electric motor which, in turn, winds the tab in the direction to cancel the hinge moment load. To help in preventing instability, a compromise can be made between the maximum error allowed in the trim and the rate of operation of the trimmer. Added sensitivity can be obtained by slowing down the motor gradually as zero error is approached.

In the ideal system, the reversion to manual control in the event of power failure should be automatic whatever the kind of failure that has occurred, although indication should be given to the pilot or engineer that the change-over has happened. At present, the tendency is to let matters slide a little by taking advantage of the fact that, if any form of failure occurs, the pilot's one obvious remedy is to cut the powered control out and return to manual control. It is wrong to do this, however, for even an alert pilot will not be able to cut out a control which is rapidly running away (possibly up to 30 to 60 deg/second) before damage has occurred. If the pilot is not expecting this rare trouble, or the automatic pilot is in control at the time, even a slow run-away may be catas-

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trophic. Instances of accidents or near-accidents because of this are already on record.

In consideration of the effects of manual reversion on the stability of the aircraft, the lecturer stated that, with proportional feed-back of "feel," the stabilities of the aircraft about all axes are unaffected by the powered controls; however, with artificial feel, it is extremely unlikely that any practical form will contain any element which gives a change of force on the controls with change in incidence.

If an automatic trimmer is not used, plausible stability conditions will have to be guaranteed in the emergency conditions with powered controls failed. It should be possible to allow certain relaxations on the degree of stability required in the emergency conditions. For instance, a reduction in the directional stability pedal-free might be allowed when the powered control units failed as long as the stability was still positive. There should be no difficulty in preventing a reduction in the stick force/g: this can be done by setting a limit on the permissible forward movement of the manœuvre point stick-free, that limit being adjusted by the degree of increase in the stick forces due to the powered control unit failure.

For some applications, notably on ultra-high speed aircraft, duplicated powered controls must be regarded as essential. In other applications, especially on very large aircraft, reversion to manual control in the event of failure in the powered control is impracticable and thus duplication becomes necessary. In many systems, failure of the complete duplicated powered control system on any one surface still causes irreversibility to be lost on that surface and, in general, flutter will ensue and wreck the aircraft in a very short time.

The degree of reliability that it is necessary to obtain on military aircraft is difficult to ascertain, but with civil aircraft the factors are less variable. In fact, taking reasonable assumptions, it can readily be shown that any one of the three main controls should not fail more than once in 4½ million hours' flying and, therefore, one individual control must not fail more than once in 14 million flying hours. In practice, it is likely, however, that cross-couplings between the halves of a duplicated power unit will exist and the reliability will thereby be decreased, necessitating a corresponding increase in the basic reliability of the half unit

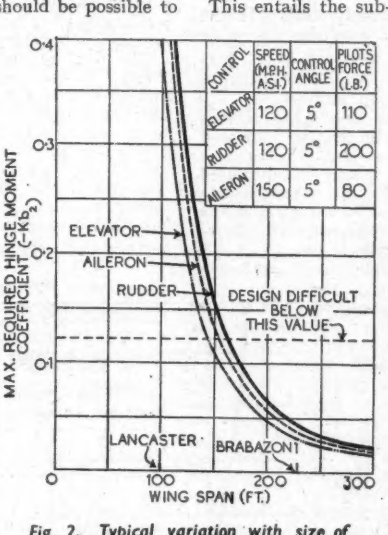


Fig. 2. Typical variation with size of required control hinge moment coefficient of a powered flying control with emergency reversion to manual.

Ingenuity and Care

On civil aircraft especially, therefore, it must not be assumed that, if the powered control is duplicated, the possibility of control failure can automatically be forgotten. The ingenuity of the mechanical, hydraulic and electrical engineers will be taxed severely to provide the necessary reliability, and exceptional care will have to be taken in the manner in which the half units are connected together, and in the measures used to diagnose failure and switch the offending units out of action. Unfortunately, the failure rates required for civil aircraft are so small that, even in the most exacting and lengthy laboratory tests there would be no chance of proving a complete system before it was required for installation.

The method of duplication which has attracted most attention in this country is that of providing on each control surface two power systems which normally work together, but in the event of failure of one, the other takes over complete charge. It is obvious that the ability of one unit to carry on satisfactorily after failure of the twin unit may be dependent on the correct operation of certain cut-out or locking devices. Some of the snags may be avoided by the use of mechanical irreversible units, but the one great drawback to the use of units of this type is that the efficiency of the powered system as a whole will fall and a greatly increased power input will be necessary. There is a fundamentally different approach to this problem of duplication to be obtained by using what might be called a "multi-surface powered control system." This entails the sub-division of the total control surface area acting about one axis of the aircraft into a number of completely separate sections, all of roughly equal control power, and each driven by its own power unit through two duplicating irreversible units.

The number of sections into which it would be necessary to divide the control surface would be dependent on the amount of control that would be needed with one section failed in the most adverse condition. Four would usually be sufficient, as a minimum of half the original control power would then be available after failure of a single section. By keeping separate signal transmission systems to each section, and by using a separate power source for each section, a system is given in which no cross-couplings exist between any of the sections and in which no reliance is placed on subsidiary mechanisms.

The sub-division of the control surface will provide an appreciable weight-saving, since it would be easier on the smaller span sections to meet the torsional stiffness criteria necessary to prevent either flutter or any undue reduction of control power. It is strongly felt that, even if there appeared to be a slight weight penalty to pay for using a multi-surface system instead of the normal duplicated unit system, it would be worth paying, especially on civil aircraft, because of the greater reliability and simplicity of layout.

Referring to structural considerations, Mr. Lyons stated that the required torsional stiffness of the main control surfaces themselves, when powered controls are used, depends on two major factors, either of which may be the critical one, viz.: (i) the tendency of the control surface to flutter, and (ii) the tolerable loss in control power at the top limiting speed. If the powered control system is duplicated and all mass balance weights are deleted, the torsional stiffness criteria will probably be decided entirely from flutter considerations.

The lecturer further suggested that, where powered controls are used with an automatic pilot, in general the automatic pilot will demand a better standard of response from the powered control surface than that demanded by the human pilot. It is quite admissible to use the auto-pilot as part of the main powered control system, i.e., the pilot can select movement of the control surfaces using part of the auto-pilot to transmit his signals and the servo of the auto-pilot as the first amplifying stage of the powered control unit. But it would probably be essential to motor the cockpit controls in phase with the control surfaces by an extra servo, or by a mechanical run from the main servo to the cockpit control in parallel with the electrical transmission to the auto-pilot, in order to prevent difficulties in switching the auto-pilot in and out.

One of the advantages in connecting the auto-pilot directly with the pilot's control run in the normal way is that, if it is thought necessary to prevent the auto-pilot applying dangerous amounts of control, the existing safety devices fitted to the cockpit controls to prevent the pilot causing structural damage, can also be used to

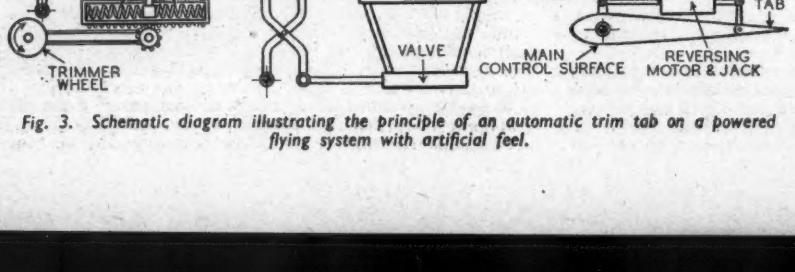


Fig. 3. Schematic diagram illustrating the principle of an automatic trim tab on a powered flying system with artificial feel.

Powered Controls . . . . .

limit the auto-pilot's movements. In addition, the tendency to lighten the pilot's operating loads on the heavier aircraft will result in smaller auto-pilot servos than would be necessary at present.

THE DISCUSSION

THE lecture was very well attended, and when the Chairman, Dr. H. Roxbee Cox, threw it open to discussion, Mr. W. E. W. Petter, B.A., F.R.Ae.S. (English Electric Co., Ltd.), gave it as his opinion that servo tabs could satisfactorily look after a very large number of aircraft indeed, in fact all those types with spans up to about 200ft, and those which did not fly extremely fast. The multi-surface system would no doubt prove excellent for civil aircraft but would be less applicable to the ultra-rapid military types where it was essential to keep everything together.

Mr. J. G. M. Pardoe, A.F.R.Ae.S. (Air Registration Board), suggested that the safety aspect of the problem was more important than any one other. Too often safety is disregarded until late in the day and then attempts are made to make safe something which is inherently unsafe. He expressed great preference for the multi-surface system, and thought the runaway problem was a nightmare.

Mr. A. J. Pegg, M.B.E. (Bristol Aeroplane Co., Ltd.), said that on the subject of powered or servo controls there was no unanimity of view among pilots. He thought that "feel" should be split into two variants: (a) stick-force with speed, and (b) stick-displacement with speed. Further, the forces necessary to operate the controls, and the gearing used, should match the size of the aircraft; in the Brabazon I case, e.g., control forces of fighter "weight" would be highly dangerous.

Mr. F. W. Meredith, B.A., F.R.Ae.S. (Smiths Aircraft Instruments, Ltd.) said that, so far as autopilot design was concerned, he would like to see an intelligent guess made as to the amount of lag which could be tolerated in a fully automatic powered control system, and suggested that a phase lag equivalent to 10 deg in the simple harmonic motion might serve as a reasonable optimum.

Mr. M. B. Morgan, M.A., F.R.Ae.S. (R.A.E.) thought that servo tabs might serve for aircraft up to 500,000 lb a.u.w., but not at high Mach numbers, although that might come eventually. He suggested that the pilot could not be relied upon constantly to trim his aircraft and, therefore, automatic trim was an absolute essential with powered controls. Further, with artificial feel, the problem of friction made the provision of a good system extremely difficult. Flutter is a vitally important factor in powered control design and the weight-saving by the deletion of mass balances would be of real worth. It might be possible to design a flutter-proof system for aircraft of conventional layout, but for swept-back wing types, etc., the calculation work involved would be very heavy indeed.

Mr. F. Rowarth, F.R.Ae.S. (Lockheed) also thought that the provision of automatic trimming was vitally important and made the suggestion that, on the score of safety, it would be better to work to a 100 per cent reliability on a 10-hour life and keep within that limit, than to work on a 99.9 per cent reliability on a 100-hour life.

Mr. T. F. C. Lawrence, B.Sc., B.Eng., A.F.R.Ae.S. (R.A.E.), made the trenchant observation that the human pilot flies with progressive control characteristics all the time, i.e., his action at any one moment is dependent upon his action of the immediately preceding moment. The design of powered control systems, particularly where the use of an autopilot could be involved, should be based on an appreciation of this fact. He further stated that in all branches of engineering where angular movement against speed was involved, variation in the ratio was provided. In aircraft control practice, however, this was not so, and he wondered why designers did not provide a variable gearing between the pilot's control and the control surfaces. These observations were strongly applauded.

Mr. C. G. A. Woodford, A.F.R.Ae.S., questioned how gust alleviation devices could be incorporated in large aircraft which did not utilize powered controls, and further questioned the advisability of employing irreversibility in the final drives, suggesting that, *par contra*, a fully reversible final drive should be embodied to permit gust alleviation.

Mr. R .H. Woodall, A.F.R.Ae.S. (Rotax, Ltd.), wanted to know how much backlash is permissible in a powered control system to prevent flutter, and asked whether velocity control or displacement control is the better in a powered system. He also queried what the amount of weight-saving might be from the deletion of mass balances.

A. E. Swain, A.F.R.Ae.S. (Saunders-Roe, Ltd.), thought that the paper offered an excellent source of reference for the aircraft designer, but considered that the case for mechanical powered controls could have been stated with more conviction. He cited the instance of the S.R.45, where the decision had been taken to employ a mechanical system using conventional controls associated with conventional feel which, however, was kept down to reasonable proportions.

Mr. F. H. Robertson, A.F.R.Ae.S. (Saunders-Roe, Ltd.), thought that the only way to reduce lag to the minimum in large aircraft is to use powered controls with electrical transmission between pilot and control surface, and went on to prophesy that the pilot would eventually be provided with a control knob with no feel other than light self-centering.

Mr. J. K. Reid (Bristol Aeroplane Co., Ltd.) thought that the right method of tackling the problem of reliability is to employ servo units so highly developed that extremely rare failures can be accepted, and of such design that the runaway condition is almost impossible.

Mr. S. M. Parker, B.Sc., A.F.R.Ae.S. (Lockheed), thought that it would be of great help if there could be some agreement among the aircraft constructors as to what was required. He also asserted that an approach to anything like perfection in the reliability of units could be obtained only if a reasonable time was allowed for the enormous amount of bench-testing required.

Major R. H. Mayo, O.B.E., M.A., F.R.Ae.S., emphasized the importance both of air- and bench-testing, but queried the all-pervading pessimism on the question of reliability. It was all a case of scrupulousness throughout the job from the earliest design stages. He thought that there must come a time when powered controls would have to be accepted and there was a danger in the present attitude of staving off this time. We should forge ahead with powered controls on aircraft which could be controlled manually, then progress through the intermediate sizes, exemplified by the S.R.45 and Brabazon I, so that we could go ahead to the 500,000 and 600,000 lb aircraft with confidence and safety.

MANNING THE R.A.F.

(Continued from page 755)

years' apprenticeship at Halton, and by the growing national interest in aviation. In addition, what we had to offer compared favourably with conditions in industry.

To-day the position is entirely reversed. The conditions of airmen's service compare unfavourably with those in civil life, and, though perhaps in a less degree, this applies to the officers as well. Careers are still uncertain, and interest in aviation has slumped most markedly. Hence the present state of recruiting.

I hope by now my main theme is clear. Unless the people of this country are fully convinced that they need a first-class Air Force, and will push the Government into action, the present situation is likely to undergo no material change. The people are uncertain in their approach to the problem because the Government has given them no lead. The only information they have is derived from the Service recruiting literature and posters, and not one Minister, except Mr. Bevin, and certainly no Socialist M.P. that I have ever heard of, has done any campaigning on the Services' behalf. What needs to be done by the people is to show their approval, in no uncertain terms, of a policy that will stimulate recruiting and Service contentment by making the Royal Air Force a worthwhile career for a man with a family and responsibilities. What the Government needs to do is to put this policy into effect.

It will cost money, but as the bookmakers say "If you don't put the money down, you won't pick it up."

TRAINER TRIALS

COMPARATIVE "side-by-side" trials of the Avro Athena and Boulton Paul Balliol advanced trainers (Rolls-Royce Merlin) are expected to start at Boscombe Down in late February or early March next year. The Athena, like the Balliol, will be a slightly modified two-seat version with a much improved cockpit enclosure, the three-seat "clover-leaf" layout having, it seems, officially fallen into disfavour. In the position of the third seat of the prototype Athena will now be fitted radio and other equipment (previously further aft) and this will have an advantageous effect on c.g. limits. So far one Mk 1 Athena (Mamba), one Mk 2 (Merlin) and one modified Mk 2 have been completed. The modified two-seat Mk 2 has not yet flown. A fourth machine with Rolls-Royce Dart turboprop is well advanced. Some 44 hours' flying have now been completed with the Mk 1 and 30 hours' with the Mk 2.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

MANNING THE R.A.F.

Navigator Who Cannot Manage

I WAS very pleased to read Air Chief Marshal Sir Philip Joubert's article in *Flight* of December 9th.

He has very obviously a fine understanding of the problems facing the R.A.F. to-day.

As a permanent-commission officer of 26 years of age—a navigator—married and with one son, I can say that I cannot hold on much longer on the present pay and allowances. But I so love the Service that I am reluctant to do anything but try to help it, and the country, in its difficulties. But we in turn *must* be helped.

I hope your publicity of this problem will not fail until a solution is reached. A F/L., R.A.F.

Promotion of Airmen and Junior N.C.O.s

PERHAPS the views of a regular airman may throw some light on the recruiting problems of the R.A.F.

Before the war, a clerk, or any other tradesman, was encouraged to fly as part-time aircrew. Since 1940 aircrews have been segregated, with the result that most ground crews have a feeling of inferiority. Perhaps it is essential that pilot and navigator should be full-time jobs, but surely tradesmen could be utilised as gunners, signallers and flight engineers; at least, it would add some much needed glamour to the life of the tradesman.

Promotion is another source of grievance with many regulars, especially those in the lower ranks. A large percentage of Warrant Officers and Senior N.C.O.s stayed in the R.A.F. after the war. Many of them retained their wartime ranks, with the result that promotion is practically dead in some trades. Because of this most regular Corporals are leaving the R.A.F. when their period of service is completed, and, furthermore, their views on the subject have influenced many National Service men against joining the Regular Air Force.

More consideration should be given to the married man who is separated from his family; many of them have heavy travelling expenses which reduce the real value of their pay considerably. A travelling allowance similar to that of men who live out of camp would be of great benefit to officers and men.

"REGULAR."

Units to be Operated by Reserve Exclusively

I, IN common with many others, was greatly surprised to read the article by Air Chief Marshal Sir Philip Joubert in *Flight* of December 9th. Particularly when the theme of the article was "splashed" in large headlines by a leading National newspaper.

The eminent writer bemoans the falling off in recruiting for the regular Air Force, with its implication of the Service being crippled by lack of skilled servicing manpower.

He advocates better pay, greater discipline, etc., as the cure, and continuously plugs the theme of "the regular Air Force is of paramount importance." The root of the trouble is there in his own words—"greater discipline." We don't want "greater discipline," we want more technical skill in the Service and the two things are just not compatible!

When on earth will the pundits of the Air Ministry realise that they just can't have a large regular Air Force at the present day, because the manpower potential which could be turned into useful tradesmen just isn't there!

What, however, there *is* in the country is a huge reserve of thousands of men with operational experience of priceless value in all trades acquired during the war, which skill is being allowed to rust away and waste for want of an adequate reserve scheme. There are also some six hundred airfields in the same state of dilapidation, falling to bits. The same thing applies to the aircraft which we *did* have, likewise all the monumental mass of stores and equipment which has been disposed of for little more than junk prices.

If these men, those aircraft, airfields and equipment were properly employed, even at this eleventh hour, we could have an Air Force reserve of real significance instead of the present futile parody of a reserve, operating a few scattered squadrons of Tiger Moths!

I am afraid my remarks up to this point have been solely destructive, but let us now turn to the constructive aspect.

The conversation in any Royal Air Force Association branch-room indicates pretty clearly that there are a large number of ex-R.A.F. types, the present writer included, who are just itching to "have a go" in their spare time, and who would be perfectly happy to do it without pay at all, if only a comprehensive reserve scheme existed into which to fit them.

Why should not some of those disused airfields be rehabilitated and made the nucleus of local reserve units? Operated exclusively by local reserve personnel of all trades, I don't mean in the sense in which some reserve units are "tolerated" at regular stations, but that they should be the sole responsibility of the reserve units, who could take a real enthusiastic interest in "their" airfield.

I think that if the Air Ministry were to make a few enquiries on these lines, they would be amazed at the amount of potential skill available. They might also find the cost not greatly in excess of the cost of the present largely unproductive advertising campaign for recruits.

One other thing. Wasn't it just about 1944, "when (according to Sir Philip) the deterioration in discipline was causing grave concern," that the Royal Air Force reached its all time record of operational effectiveness?

Wickford, Essex. J. C. ELKINS.

CLIPPED WINGS

Giving Germans the Joy of Life

AS an ex-Service pilot and a present-day "V.R." pilot, I was conscious of a sense of disgust when reading the letters written by S/L. L. S. Ash and "One of the Few," published in *Flight* on December 9th, referring to an understandable if not well expressed appeal by Hans-Joachim Kowsky. I was even further disgusted with what I assume to be the meaning of the Editor's note attached thereto.

Perhaps the Editor would like to define publicly *Flight's* subtle purpose in printing the German's letter.

The military implications in allowing Germans to fly again are obvious, but I see (again in *Flight* of December 9th) that the Hereford Aero Club are not bigoted in that respect whatsoever, and surely we cannot forever prevent the German people from becoming airborne. Suitable control regulations governing design and manufacture are already enforced by our administration in Germany on many trades and could no doubt be applied to aircraft manufacture and operation.

S/L. Ash and "One of the Few" have apparently never experienced that inexplicable joy and satisfaction of flying for its own sake, that has been the fortune of many pilots. Or if they have (which I very much doubt), what manner of men are they to deny that sensation to others?

Guildford, Surrey. D. M. LAVER, Ex-S/L.

FORTHCOMING EVENTS

Until Jan. 20th.—Royal Geographical Society and Institute of Navigation: Joint exhibition, "Navigation through the Ages." Jan. 10th.—Three films on radio systems. Commentary by R. F. Hansford.

Dec. 23rd.—R.Ae.S. (Glasgow): Annual General Meeting.

Jan. 11th.—R.Ae.S. (Belfast): "One Thousand Miles an Hour," Prof. G. T. R. Hill, M.C., M.Sc., M.I.Mech.E., F.R.Ae.S.

Jan. 15th.—British Interplanetary Society: "The Problem of Interplanetary Flight" (Part 2).—"The application of Nuclear Energy," L. R. Shepherd. A summary and Discussion o. Parts 1 and 2 will follow.

Jan. 19th.—R.Ae.S. (Brough): Lecturettes by branch members.

Jan. 19th.—Royal United Service Institution: Films, "Operation Crossroads" and "Operation Plainfare," W. Courtenay, M.M.

Jan. 22nd.—Helicopter Association of Gt. Britain: "Helicopter Operations—Some of the Problems and Prospects," N. E. Rowe, C.B.E., D.I.C., B.Sc.

Jan. 28th.—R.Ae.S. (Weybridge): Annual Dance.

Feb. 1st.—R.Ae.S. (Belfast): "The Propeller Turbine Engine," F. M. Owner, M.Sc., F.R.Ae.S., M.S.A.E.

Feb. 2nd.—Royal United Service Institution: "Meteorology in War," Sir Nelson King-Johnson.

Feb. 9th.—Royal United Service Institution: "Land/Air Warfare," Air Vice-Marshal W. L. Dawson, C.B., C.B.E.

Feb. 9th.—R.Ae.S. (Weybridge): "Civil Air Transport," P. G. Masefield, M.A., F.R.Ae.S.

Feb. 12th.—Rugby Football, Twickenham. Royal Navy *versus* Royal Air Force.

Feb. 12th.—British Interplanetary Society: "The Design of Liquid-Propellant Rocket Motors," J. Humphries, B.Sc., G I. Mech. E.

Feb. 16th.—R.Ae.S. (Brough): "Jet Engines," Mr. Winter.

SERVICE AVIATION

Royal Air Force and Naval Aviation News and Announcements

R.A.F. Appointment

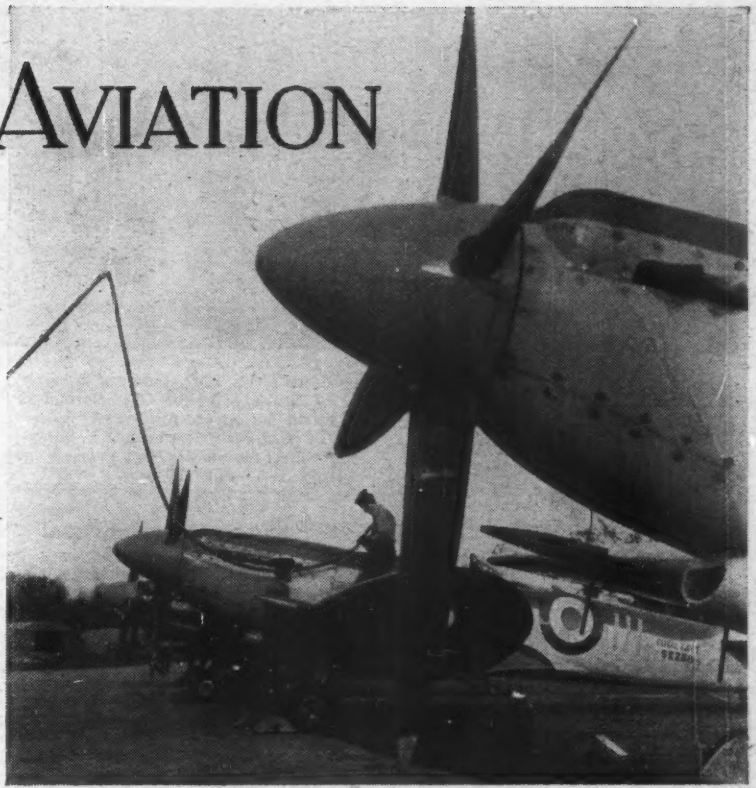
IT is announced by the Air Ministry that A. Cdre. S. N. Webster, C.B.E., A.F.C., is to succeed A. Cdre. G. E. Nicholetts, A.F.C., as Commander of the R.A.F. Central Photographic Establishment at Benson. A. Cdre. Webster, who recently returned from Hong Kong, where he was A.O.C. for two years, won the 1927 Schneider Trophy competition in Venice, while serving as a flight lieutenant with the High Speed Flight.

Lord Tedder Replies

THE failure of certain units of the R.A.F. to play their part in the Exercise "Sunrise" recently led to emphatic and widely publicized statements of dissatisfaction regarding the state of the Air Force, many of which have been judged unjustified. A leading article in *Flight* recently analysed, as far as was possible, the lessons to be learnt from the operation, and our statements coincide closely in many respects with the views lately expressed by Lord Tedder.

Addressing the Worshipful Company of Gold and Silver Wyre Drawers at the Mansion House on December 14th, the Chief of Air Staff, Marshal of the Royal Air Force Lord Tedder, said:

"It is suggested in some quarters, I am sure out of ignorance and not ill will, that the morale and discipline of the Air Force is weak. I wonder if the Berliners think that R.A.F. morale and discipline is weak or its skill less than when the roar of British engines meant not more food but more bombs for Berlin?" Referring to Exercise "Fiasco" last week Lord Tedder commented: "These code names are difficult so I had better interpret—Fiasco: Flying In Atlantic Storms Curtails Operation. Our opponents were the Royal Navy and nature, and nature won. As you know as well as I do, when nature is in a bad temper she is vicious and remorseless, especially in the air, and it was only thanks to Providence, to the skill, courage and determination of the aircrews, who for long hours of darkness and storm fought for their lives, and to the moral courage of the commanders who refused to commit their main force to such conditions, that we got through without serious losses."



NAVAL AUXILIARIES: Seafires of No. 1832 (R.N.V.R) Squadron lined up at Culham during a recent week-end exercise. Training of reserve naval airmen in the London area is now undertaken at this station.

UPAVON OCCASION: In a recent gathering at R.A.F. Station Upavon, Wilts., were (L. to R.) A. Cdre. H. L. Patch, Mrs. G. Gillan, Mrs. L. V. E. Atkinson, A.V-M. A. L. Fiddament, A.V-M. R. Ivelaw-Chapman, Mrs. R. Ivelaw-Chapman and A.V-M. W. L. Dawson.

R.A.F. Unit Badges

BADGES have been approved by H.M. the King for the R.A.F. Medical Training Establishment and Depot, Moreton-in-the-Marsh, and the Central Signals Establishment at Watton. The M.T.E. badge consists of a torch entwined by a serpent, with the motto "Salutem Alere Morbum Levare" ("to cherish health: to alleviate sickness"), and for the Signals Establishment the badge comprises a "hawk's lure" with the motto "Ars Est Celare Artem" ("the art is to conceal the art").

Bombing the Nelson

DIVE-BOMBING attacks on the battleship *Nelson* in the Firth of Forth by Naval aircraft will be resumed on May 1st next year; an earlier series of trials, which began last summer, was not completed. Barracudas were used in the previous attacks.

R.A.F. Ice-hockey Team

THE latest addition to Air Force sport is an ice-hockey team affiliated to the R.A.F. Winter Sports Association. With two exceptions all the members

Guests of No. 3507 (County of Somerset) F.C.U.: (L. to R.) Air Chief Marshal Sir Arthur Barratt and Mrs. W. R. Farnes; G/C. C. R. Richdale with Sq/O. K. Bagley; Air Chief Marshal Sir Hugh Saunders and Mrs. Callaway.

Service Aviation . . . . .

are Canadians who have played ice-hockey in their own country and who served with the R.C.A.F. during the war. One of them, F/L. Taylor, is still on R.C.A.F. duties in London; the others joined the R.A.F. after their release. The team is captained by F/L. D. G. Evans.

Ex-Apprentices Leave the R.A.F.

REPLYING to a question by A. Cdre. A. V. Harvey, C.B.E., M.P., in the House of Commons on Dec. 7th, the Under-Secretary of State for Air, Mr. de Freitas, stated that since the end of the war, 744 ex-apprentices trained at Halton have purchased their discharge from the R.A.F.

Observer Corps Recruiting

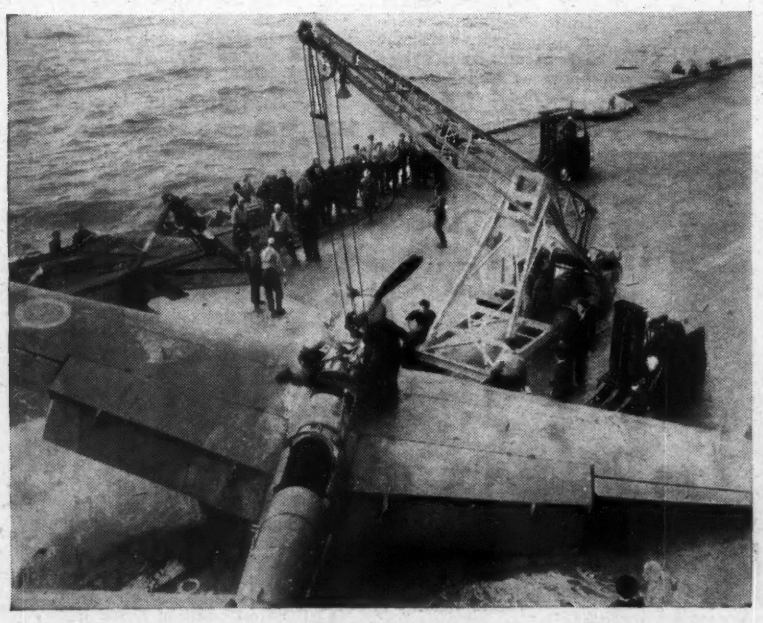
DURING last month 500 men and 80 women applied to join the Royal Observer Corps. Volunteers are still needed in all areas to bring the corps up to its required strength of 28,000.

Pakistan Air Command

THE Pakistan Defence Ministry has announced the appointment of A.V.-M. R. L. R. Atcherley, C.B.E., A.F.C., as Air Officer Commanding the Royal Pakistan Air Force, in succession to A.V.-M. A. L. A. Perry-Keene, O.B.E., who took up command of the service on its inception last year. A.V.-M. Atcherley has been in charge of the Royal Air Force College at Cranwell since October, 1945.

"Plainfare" Statistics

FROM the beginning of the air-lift on June 28th, until the beginning of this month, R.A.F. aircraft engaged in the operation flew over 10,000,000 miles, and during that period took 132,000 tons of freight into Berlin. On outward flights 24,274 passengers, 3,500 tons of freight, and 20,500 lb of mail were carried.



CLEARING THE DECK: Flight deck crews of H.M.S. Illustrious remove a damaged Barracuda after a crash-landing on the carrier, during the stormy weather persisting throughout the Naval/Air exercises.

Liverpool Reserve Centre Open

BOTH air- and ground-crews are now being recruited at the headquarters of No. 42 R.A.F. Reserve Centre, Lime Tree Farm, Fazakerley, Liverpool 10, bringing the total of reserve Centres now recruiting to 21. Training at Liverpool has not yet begun, but will take place as soon as facilities are available.

Aircrew Recruiting

SINCE the new R.A.F. aircrew recruiting scheme was introduced in September, over 3,000 volunteers have come forward, 1,750 of which are ex-flying members of the R.A.F. It is hoped that at least half of the applicants will be accepted.

Fireflies for Sweden

THE first of a number of target towing versions of the Fairey Firefly has been delivered by air to Stockholm by the Fairey's chief test pilot, G/C. G. Slade. The aircraft was flown from Ringway to Walkenburg (Holland), then to Kastrup (Copenhagen), and on to Bromma (Stockholm) where it was handed over to the Swedish firm of Svenske Flygtjänst A.B., which is to operate target towing services for the Swedish Government.

This version of the Firefly, which carries a tow-line of 7,000ft, with windmill re-wind, was developed in response to numerous overseas enquiries, and was the centre of considerable interest in Holland and in Denmark on its delivery flight.

Brough and B.A.F.O. Gifts

RECENT contributions to the R.A.F. Benevolent Fund include £309 from Blackburn Aircraft, Ltd.—the result of a flying display held at Brough—and nearly £50 from R.A.F. airmen in Germany, stationed at Luneburg, Bad Oeynhausen, and Gatow. From this year's Battle of Britain appeal the Fund has received £16,500.

Reunion

INFORMATION regarding a proposed Reunion for all ranks, aircrew and ground-crew, of No. 78 Squadron, may be obtained from J. D. Lane, 4, St. Mary Abbot's Court, Kensington, W.14.